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NEW

AMERICAN CYCLOPÆDIA.

VOL. VII.

EDWARD–FUEROS.

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THE NEW

AMERICAN CYCLOPÆDIA:

A

Popular Dictionary

OF

GENERAL KNOWLEDGE.

EDITED BY

GEORGE RIPLEY AND CHARLES A. DANA.

VOLUME VII.

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THE

NEW AMERICAN CYCLOPÆDIA.

EDWARD (THE ELDER)

EDWARD I., surnamed the Elder, son and successor of Alfred, king of the West Saxons, ascended the throne in 901, died in 925. His claim to the throne, though recognized by the witenagemote, was disputed by his cousin Ethelwald, who gained the support of the Northumbrian and East Anglian Danes. The rebels marched through the counties of Gloucester, Oxford, and Wilts, and Edward, unable directly to oppose them, retaliated their ravages in the country of the East Angles. He thought proper to withdraw his army, loaded with booty, before the approach of the rebels, but the venturous Kentish men, greedy of more spoil, stayed behind in defiance of orders. They were assaulted by the East Angles, and resisted so valiantly that though obliged at last to retreat, it was not till after they had slain a great number of the bravest of the enemy, and had terminated the rebellion by causing the death of Ethelwald himself. The reign of Edward, as of many of his predecessors and successors, was occupied with subduing the turbulent Danes, who abounded and were constantly reënforced in the provinces of East Anglia and Northumbria. In this task he was assisted by his sister Ethelfleda, who governed Mercia. He protected his territories by fortresses which gradually became centres of trade and population. He gained two signal victories at Temsford and Maldon, and subjected all the tribes from Northumbria to the channel to his immediate control. He was twice married, and left a numerous family, and 3 of his sons, Athelstan, Edmund, and Edred, successively occupied the throne.

EDWARD II., surnamed the Martyr, king of the Anglo-Saxons, son and successor of Edgar, born in 962, ascended the throne in 975, and was murdered in 978. The intrigues of his stepmother Elfrida raised a faction in favor of her own son Ethelred, who was but 7 years of age. Ecclesiastical parties took opposite sides, the married clergy who had been ejected in the preceding reign regarding Elfrida as their patroness and supporting the pretensions of Ethelred, and the monastic followers of St. Dunstan maintaining the superior claim of Edward. A civil war had already begun, when at a general meeting of the witenagemote Edward was after much

EDWARD (THE CONFESSOR)

opposition formally accepted as king. The strife among the clergy, however, still divided the kingdom, and the party opposed to St. Dunstan plotted the murder of the young monarch. He was stabbed in the back at Corfe castle, the residence of his stepmother, as he was drinking a cup of mead on horseback, and sinking from his seat he was dragged away by the stirrup by his frightened horse.

EDWARD III., surnamed the Confessor, king of the Anglo-Saxons, son of King Ethelred II., successor to Hardicanute, born in Islip, Oxfordshire, in 1004, ascended the throne in 1042, died Jan. 5, 1066. His mother was a Norman princess, Emma, and during the Danish domination which had succeeded the death of Edmund Ironside, he dwelt in exile in Normandy. When the news of the death of Canute in 1035 reached him, he determined to assert his pretensions to the crown, crossed the channel with a fleet of 40 ships, and landed at Southampton. He found himself opposed by his mother, who had become a second time queen of England by marriage with the Danish monarch, and was now regent of the kingdom. Menaced with destruction by a constantly increasing force, he hastily effected his retreat. With his brother Alfred he received a perfidious invitation from King Harold to cross the sea in 1037. Alfred was murdered at Guildford, and Edward, apprised of the fate which was awaiting him, escaped into Flanders. After the accession of his half brother Hardicanute, Edward was received with honor into England, presented with a princely establishment, and was at court when the king suddenly died in 1042. The Danish heir Sweyn was then absent from the kingdom; the rightful heirs of the Saxon line, the sons of Edmund Ironside, were in exile in Hungary; the Anglo-Saxons were determined to throw off the Danish yoke; the Danes were divided and dispirited; Edward was the nearest to the throne of any one present, and after a short period of hesitation and commotion he was recognized as king in a general council at Gillingham. His reign was the period when the mutual aversion of the two fierce Teutonic peoples, whose struggles for dominion had vexed the country during 6 generations, began to subside, when intermarriages

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and a blending of language and customs nearly effaced the distinction between the two races, and when the Normans began to exercise a potent influence in the country, both nations of which they were soon to prostrate. The first royal act of Edward was to strip his mother, whose resistance had defeated his first attempt to obtain the throne, of her immense treasures, and to confine her for life in a monastery at Winchester. The government was at this time in the hands of 3 powerful noblemen: Earl Godwin, who ruled all the southern provinces; Earl Leofric, who governed Leicester and the northern counties of Mercia; and Earl Siward, whose sway extended from the Humber to the confines of Scotland. Edward sought the protection of Earl Godwin by marrying his daughter Editha, a lady praised by the chroniclers for her learning, piety, and benevolence; yet the motive which prompted Edward to marry her was merely political, and the alliance proved therefore a source of enmity instead of friendship between the king and his father-in-law. Edward was partial both to Norman manners and people; many foreign churchmen and dignitaries had followed him to England, where they had acquired influence in the government. A popular jealousy was already felt against them, when in 1050 Eustace, count of Boulogne, with his train, visiting England, quarrelled with the burghers of Dover, and in the tumult several persons were slain. The affray was reported to the king at Gloucester, by the discomfited Eustace, and Edward gave orders to Godwin, in whose government Dover lay, to chastise the insolence of the men of that city. The earl refused to obey; a rupture was therefore unavoidable, and 3 armies under the command of Godwin and his 2 sons immediately marched against the king in Gloucestershire. Edward summoned to his aid Leofric and Siward, and was quickly in a condition to intimidate his opponents, when it was agreed to refer the dispute to the decision of the witenagemote. Godwin, however, fled with his wife and sons to Flanders; their estates were then confiscated, Queen Editha was confined in a monastery, and the greatness of this family seemed completely destroyed. Tranquillity was hardly restored when William, duke of Normandy, the future conqueror, reached the coast of England to render assistance to his royal kinsman. He was received in a manner worthy of his great reputation, visited several of the royal villas, and was dismissed with magnificent presents. Godwin, however, having gradually collected a fleet, suddenly appeared in 1052 on the southern coast of England, swept away the ships from the different harbors, entered the Thames, menaced London, and extorted from the king the restoration of himself and his son Harold to their earldoms and the banishment of the foreigners; and the primate and the numerous other Norman functionaries fled for their lives. Godwin did not long survive this triumph, and left his possessions to his son Harold, his equal in ambition and his superior in address.

At this period occurred the events which form the groundwork of Shakespeare's tragedy of "Macbeth." In 1039, Macbeth, a turbulent nobleman, murdered Duncan, king of Scotland, chased Malcolm, his son and heir, into England, and usurped the crown. The exiled prince received from Edward permission to vindicate his rights with an English army, but for 15 years the power of the murderer defeated every attempt. At length in 1054 Malcolm was successfully supported by Macduff, the thane of Fife, and by Siward, earl of Northumberland. The fall of Macbeth cost the death of the son of Siward; the Northumbrian earl died soon after, when Harold obtained that earldom, in opposition to the rights of an infant heir, for his own brother Tosti. Thus the support which Edward gave to Malcolm resulted in adding largely to the power of his own most ambitious and dangerous subject. To oppose Harold's further progress, the king invested Algar, the son of Leofric, with the government of East Anglia, but the intrigues of Algar quickly led to his expulsion from his new possession. He, however, soon returned into Herefordshire with an army of Welsh and Norwegian auxiliaries, was opposed by the inconstant English monarch, but was able to maintain the cause of the king in spite of the king himself, and returning again, forced Harold to a compromise and was reinstated in East Anglia. He was again expelled and again restored, and at his death in 1058 Harold was left without a rival, the most powerful subject in England. Edward the Outlaw, the Saxon heir to the throne, after a life of exile, died within a few days of his arrival in England, and there now stood between Harold and the crown only the young and feeble Edgar. The infirm old king, inveterate in his animosity to the family of Earl Godwin, turned his eyes toward his kinsman across the channel, William of Normandy, as a person whose capacity and power would render him the most formidable rival to Harold. Harold, being thrown in a tempest upon the coast of Normandy, was obliged while thus in the power of William to swear that he renounced all hope of the crown, and to do homage for his lands and honors to William, as the appointed successor of Edward. He returned to England, and, as Hume says, deterred the king from abdicating in favor of William, increased his martial renown by an expedition against the robbers of Wales, which terrified them into submission during the next 4 reigns, extended his sway by marrying the sister of Morcar of Northumberland, and was crowned king on the very day of Edward's death. It was fortunate for the memory of Edward that he occupied the interval between the Danish and the Norman conquests; that his reign was a time of comparative tranquillity under a native prince, between two periods of subjection to conquerors. The laws and customs of "good King Edward" were long remembered with popular affection. He was highly esteemed for his sanctity, was the first English prince that touched for the king's evil, and was canonized

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and styled "the Confessor" about a century after his decease. The most commendable feature of his government was his attention to the administration of justice, and to collecting the laws of the realm. His compilation is lost.

EDWARD I. (of the Norman line), king of England, surnamed Long Shanks, from the excessive length of his legs, son of Henry III. and of Eleanor of Provence, born in Westminster, June 16, 1239, crowned Aug. 19, 1274, died July 7, 1307. Being invested with the duchy of Guienne, his right to that province was disputed by Alfonso X., king of Castile, who, however, renounced his claim in consequence of Edward's marrying his sister. In 1254 he received the lordship of Ireland and of the provinces which had been seized in the reign of John Lackland by the king of France. He supported the throne against the revolted barons, and was with his brother Richard I. made prisoner at the battle of Lewes in 1264. He recovered his liberty in 1265, defeated and slew Simon de Montfort, earl of Leicester, at Evesham, and in 1267 conquered the last of the insurgents in the isle of Ely. He now joined the crusaders, and served 2 years in the East. Nearly 2 years after his father's death, he was crowned without opposition at Westminster, and began to signalize his ability both as a warrior and legislator. His arms were first directed against Llewellyn, prince of the Welsh, whom he reduced, but who rebelled again, and was slain in single combat by an English knight immediately after the army of Edward reappeared in that country. It is said that Edward caused the massacre of all the bards of Wales, for fear that their songs should revive the patriotism of their countrymen; but this story may have been invented in view of the strict censorship which he exercised over the national poetry. He established corporate bodies of merchants in the principal towns of Wales, and introduced the jurisprudence of the English courts. In the castle of Caernarvon his queen Eleanor was delivered of her son Edward; the natives claimed the child as their countryman, and he was declared prince of Wales, a title which has since always been borne by the eldest son of the sovereign. In 1289 he resolved upon the subjugation of Scotland, to the crown of which there were at this time 13 claimants. Being invited to the office of arbitrator, he first took possession of many of the Scotch fortresses, and then conferred the crown upon John Baliol, who soon renounced his allegiance. Edward marched again across the Tweed, gained a great victory at Dunbar in 1296, sent Baliol into exile in Normandy, bore away the Scotch sceptre and crown, and left the highest offices of government in the hands of Englishmen, under the earl of Surrey, who received the title of guardian of the kingdom. The Scots rallied in 1297 under the chieftain William Wallace, and drove the English out of their kingdom, totally defeating them in the battle of Stirling, Sept. 11. Edward hastily finished the war which he had in the mean time undertaken in France, advanced again to the Forth, and defeated the insurgents with the loss of from 20,000 to 40,000 men near the forest of Falkirk, July 22, 1298. Wallace himself escaped. The rebellion again broke out in 1303, and again Edward overran the kingdom, its temporary subjugation being completed by the surrender of the strong castle of Stirling in 1305. Wallace was soon after surprised and captured, and was hanged in Smithfield. In 1306 the war was again kindled by Robert Bruce, who was elected king, and though at first unsuccessful, at length gained a decisive victory over the earl of Pembroke. Edward, now enfeebled by age and disease, marched again to the north with the purpose of rendering Scottish rebellion from that time impossible; but he was surprised by death on the frontier at Burgh-upon-Sands. The most enduring results of the reign of Edward were the reforms which he introduced in the administration of government, of justice, and of the finances, which have gained for him the title of the "English Justinian." He ameliorated the laws, confirmed and finally established the two great charters, gave to the parliament the form which it has since retained, and is said to have first instituted justices of the peace. The Jews, who during the whole period of his reign were objects of the bitterest hatred to the great mass of the people, were cruelly despoiled, and in 1290 ordered under penalty of death to quit England for ever before a certain day.

EDWARD II., king of England, son and successor of the preceding, born in Caernarvon, April 25, 1284, ascended the throne in 1307, murdered Sept. 27, 1327. He was of an irresolute character and dissipated habits. From his childhood he had lived in close intimacy with Piers de Gaveston, the son of a gentleman of Guienne, who had at length been banished from the kingdom as a corrupter of the prince. Edward I. on his deathbed forbade his son under pain of his paternal malediction to allow the vicious favorite to return into England; yet the first act of the new king was the recall of Gaveston, whom he created earl of Cornwall and married to his own niece, and to the scandal of the whole kingdom appointed him regent while he himself went to France to marry the princess Isabella. A formidable league under the earl of Lancaster forced Gaveston into exile; but instead of being disgraced, he was appointed lieutenant of Ireland, and accompanied for some distance on his way by his royal friend. He returned soon after, when an army raised by confederate powerful barons and commanded by the earl of Lancaster pursued him to the north; he was besieged and captured at Scarborough, and, without any pretence of a legal process, was executed. Edward, at first threatening vengeance against all who had taken a part in the death of his favorite, seemed soon to forget his friendship and his hatred, and turned his attention to the revolted Scots. At the head of an immense army he crossed the frontier, but after losing the battle of Bannock-

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burn fled from the kingdom with a body of Scottish cavalry at his heels. In 1321 he was again defeated at Blackmoor, and pursued even to the walls of York. The public discontent was increased by the honors bestowed upon Hugh Spenser, a new favorite, and an armed insurrection of the barons under the earls of Lancaster and Hereford caused the Spensers to be banished; but on their return Lancaster was seized and put to death with the same indignities which had formerly by his orders been exercised against Gaveston. Edward, now at peace with his own subjects, hoped to secure his tranquillity by negotiating in 1323 a truce for 13 years with Scotland. Though the triumph of the Spensers was complete, the partiality with which the king regarded his favorites had the effect of alienating not only his subjects but also his queen. Under pretence of arranging some differences between her husband and her brother she went to France, where she found a great number of English fugitives, the friends of Lancaster, the most considerable and potent of whom was the young Roger Mortimer. A domestic rebellion supported by a foreign invasion was projected, and in 1326 the queen with a foreign force of 3,000 men, led by Hugh Mortimer and John of Hainaut, landed on the coast of Suffolk. The most powerful nobles and prelates hastened to meet her, and Edward, having in vain appealed to the citizens for support, was obliged to retreat to the marshes of Wales. The queen pursued him, and he took shipping for Ireland, but, unlucky by sea as well as by land, was driven back by contrary winds, was found concealed in the mountains of Wales, and sent in custody to the castle of Kenilworth. The favorite Spenser was taken at the same time and hanged. The parliament being assembled, by the influence of Isabella and Mortimer, it was resolved that the reign of Edward of Caernarvon had ceased. While imprisoned in Berkeley castle under the charge of ruffians employed by Mortimer, Edward II. was found dead in his bed in the morning after shrieks had been heard from his apartment during the night, and his distorted features betrayed the agony in which he had expired.

EDWARD III., eldest son of Edward II. and Isabella of France, born at Windsor, Nov. 13, 1312, proclaimed king of England, Jan. 25, 1327, died at Shene, now Richmond, June 21, 1377. At the age of 12 years he went with a splendid retinue to France to do homage to Charles IV. for the possession of Guienne and Ponthieu, which had been resigned to him by his father. He remained with his mother at the French court, was contracted in marriage by her to Philippa, daughter of the count of Hainaut, accompanied her and her followers in their invasion of England, and was declared king after the captivity of his father. A council of regency, consisting of 4 bishops and 10 noblemen, most of whom, being of Isabella's party, gave up to her and Mortimer (now created earl of March) the ascendency in the government, had but just been appointed, when Robert Bruce, in violation of the truce between Scotland and England, sent an army of 24,000 men under Randolf and Douglas, which ravaged the county of Cumberland. Young Edward marched to the north with over 40,000 men, made a vain pursuit of the Scots, came up with them twice when they were in inaccessible positions, is recorded to have wept when he found himself out-generalled by the skill of an inferior enemy, and concluded an inglorious campaign by a treaty in which the entire independence of Scotland was recognized. The odium of this settlement was thrown upon Isabella and Mortimer, who increased their unpopularity by intrigues against the earl of Kent, whom they caused to be executed for high treason in 1330. At the age of 18, Edward, having determined to assert his own authority against his mother and her favorite, contrived their arrest. Mortimer was executed for high treason at Smithfield, and Isabella was confined for the rest of her life in the manor of Risings. Immediately after assuming the government he renewed his father's and grandfather's project of conquering Scotland, and secretly encouraged the claim of Edward Baliol to the crown of that country, who was willing to hold it as a fief of the English monarch. Baliol won the crown and lost it within 3 months, and the incursions of the Scots gave to Edward the pretext which he desired to renew the war and attempt to restore the refugee. He laid siege to Berwick, and (July 19, 1333) defeated on Halidon hill with great loss the army of the regent Douglas, who had approached for its relief. The town and castle were immediately surrendered, and Baliol being again seated on the throne of Scotland dismembered the kingdom by a large cession of territory to England, a measure which was followed by his flight to England within 4 months. Three times Edward invaded and devastated Scotland in support of Baliol, but had not conquered the independent spirit of the country when he suffered the war to languish, having determined to lay claim to the crown of France against Philip of Valois. The ground of this pretension was, that although females were excluded from the French throne, the male descendants of females were not; and that as the son of Isabella, the daughter of Charles IV., his claim was better than that of Philip, who was descended from a younger brother of Charles IV. To carry his mighty design into execution, he made alliance with several continental princes and rulers, the chief of whom were Louis of Bavaria, emperor of Germany, the dukes of Brabant and Gueldres, and Artevelde of Ghent. Edward formally published his claim in 1337, and in the following year sailed with a numerous fleet to Antwerp, designing to begin the campaign with the siege of Cambrai; but perceiving the difficulty of the enterprise, he advanced into France with about 50,000 men, was almost confronted with an army of nearly double the force under Philip, yet no engagement ensued, and he at

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length returned to Brussels and disbanded his army without having derived any advantage from his immense expenditures. He returned to England in 1340, obtained an unprecedented grant from parliament, defeated a French fleet off Sluis which Philip had sent to intercept him, returned to the continent, and at the head of 200,000 men undertook at the same time the sieges of Tournay and St. Omer, both of which were unsuccessful; and he quickly concluded an armistice for 9 months, and soon after another for 3 years and 8 months. Another English campaign in France was begun in 1346 under the earl of Derby, and prosecuted with uninterrupted success. Edward also landed with a numerous force on the coast of Normandy, advanced to Rouen, sent his light troops to insult the fauxbourgs of Paris, and on Aug. 26 gained over Philip the decisive battle of Crécy. The siege of Calais followed, and while the chivalry of England lay before the walls of that city, the Scots suddenly crossed the frontiers, but were defeated by a miscellaneous and rapidly collected army, led, according to the improbable testimony of Froissart, by Queen Philippa. Calais surrendered after an obstinate defence, and a truce followed which lasted till 1355. Meantime, Edward invaded and widely desolated Scotland, causing a havoc long remembered by the natives. The war was renewed in France under the Black Prince, who gained in 1356 the memorable victory of Poitiers, in which he took King John of France prisoner, who was not ransomed till 1360. In that year the "great peace" was concluded at Bretigni, by which Edward renounced his pretensions to the crown of France and restored his conquests, retaining only the full sovereignty of Poiton, Guienne, and the county of Ponthieu. Though the misfortunes of the latter years of his reign contrasted strongly with the glories of its commencement, and though his victories left few lasting acquisitions, yet they gave to England a lustre and renown which were long her strength and safety. In his reign the elegant arts began to be cultivated, the castle of Windsor was rebuilt, the order of the garter was instituted, and English poetry and prose may be said to have been begun.

EDWARD IV., king of England, born in Rouen, April 29, 1441, died April 9, 1483. An old chronicler speaks of "the troublous season of King Henry VI., the prosperous reign of King Edward IV., the pitiful life of King Edward V., and the tragical doings of King Richard III." The lot of the feeble Henry VI. fell most inappropriately in an age of violence, to which he brought only meekness of spirit; and he saw during his reign the splendid achievements of foreign victory exchanged for defeats and ignominy, his title to the throne disputed, and England torn to pieces by civil war. His own insignificance, the dishonor of the English arms, and the passionate tyranny of his indomitable queen, Margaret of Anjou, were the occasion of reviving the long forgotten pretensions of the house of York. The great Lancastrian chiefs, Cardinal Beaufort and the dukes of Bedford and Gloucester, who ably though discordantly supported the throne during the minority of Henry, were dead, when Richard, duke of York, the father of Edward IV., returned from Ireland, cautiously and gradually advanced his claim to the throne, gained the support of the powerful earls of Warwick and Salisbury, took arms against Somerset, the last great nobleman of the Lancastrian branch, and began by a victory at St. Albans, in 1455, the wars between the red rose of Lancaster and the white rose of York. The claims of both these Plantagenet lines were derived from Edward III. From the first 2 sons of that sovereign no issue survived; the 3 Lancastrian kings who had occupied the throne for more than half a century were descended from the 4th son; the dukes of York were descended from the 5th son, but had also by intermarriage become heirs to the rights of the 3d son. The question of genealogical right, complicated in itself, was rendered more so by the irregular accession of the 1st Lancaster, while Edmund Mortimer, the heir of the 3d son, was alive, and by decrees of parliament. Richard, duke of York, after various successes and reverses in maintaining his claim, was defeated and slain by Queen Margaret, at Wakefield, in 1460; and young Edward, the inheritor of his father's pretensions and ability, immediately put himself at the head of an army of Welsh borderers and mountaineers, and defeated a formidable force under the earls of Pembroke and Ormond, at Mortimer's Cross. He then marched southward, supported by the earl of Warwick, who suffered a defeat at Barnet Heath by which Henry was again restored to his friends. Edward marched directly to London, which he entered without opposition, and where his youth, boldness, and beauty gained him the public favor. He was proclaimed king in 1461, and thus there were two kings and two royal armies in the land. Both parties made the most formidable preparations for battle, and at Towton, near York, 100,000 Englishmen were drawn up, in not very unequal division, in hostile array. Proclamation had been made that no quarter should be given, and the battle was probably the bloodiest in English history. It lasted more than a day, and ended, after the slaughter of more than 30,000 persons, in the total rout of the Lancastrians; and thus the crown was firmly placed on the brow of Edward IV. The cause of the red rose seemed desperate, but it was supported by the courage and energy of Margaret. She sailed to France, seeking the alliance of the French king; and perils by land and by sea, shipwreck, and capture by roving banditti, make up the wild story of her adventures, till in 1464 she appears again in Scotland, at the head of only 500 French troops, with whom, and a band of Scottish borderers, she gave battle to the English general, Lord Montacute, near Hexham. The Lancastrians were again com-

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pletely routed; the king and many of the chiefs were captured on the field, or after lurking for a while in concealment; and Margaret again made her escape through Scotland into France, with her son and his famous preceptor, Sir John Fortescue. Edward, acting upon the maxim of Macchiavelli, with characteristic vigor, made a terrible slaughter of his enemies in the first moment of victory, and in his subsequent administration ruled with clemency. After this second retreat of Margaret, he devoted himself for a time to pleasure. He had been hunting in the forest of Grafton, when he met, at her father's house, Elizabeth, widow of Sir John Grey and daughter of Richard Widville, Baron Rivers. The impetuous king, in vain seeking an illicit union, consented to a private marriage with her (April, 1464), and she was within a year publicly acknowledged queen, and her father was made an earl. This union displeased the powerful and haughty earl of Warwick, who had before been authorized to negotiate for the marriage of the king with the princess Bonne of Savoy, and who was moreover indignant at the influence possessed by the new queen, which she employed in the elevation of her own friends. The malcontent earl, allying himself with Edward's brother, the duke of Clarence, broke out into open revolt in 1469. The effect of his combination with the discontented nobility and gentry was quickly seen in seditions fomented in every part of the country. In Yorkshire, Robin of Redesdale, a hero among the troopers of the frontier, took the field with 60,000 men. Edward marched against them, unaware of the danger to which he exposed his capital. Warwick, absent in France, had gained the favor of Louis XI., and had even become reconciled with his old enemy, Margaret. He landed at Dartmouth with a small body of troops, where his popularity swelled his army in a few days to more than 60,000 men. He advanced to the north, and his approach shook the fidelity of the royal troops. Edward fled in 1470 to Holland, and his imprisoned rival was led forth from the tower to hear the streets of London resounding once more with the name of King Henry. A parliament was summoned in the name of the restored king, by which Edward was pronounced a usurper, his adherents were attainted, and all acts passed by his authority repealed. This restoration gave, however, but a brief respite to the Lancastrian family. The fugitive Edward, secretly assisted by the duke of Burgundy, collected a body of Flemings and Dutchmen in a few months, with whom he entered the Humber, and landed at Ravenspur. He advanced into the interior, pretending at first that he came only to recover his patrimony as duke of York, and making his followers cry "Long live King Henry," till he received reënforcements which put him in a condition to face the enemy. The adverse armies met at Barnet, on Easter morning, April 14, 1471, and the Lancastrians were defeated and Warwick himself slain. Edward now again became master of London, and of the person of Henry, who was remanded to the tower, never again to leave it. Meanwhile, Margaret, with her son, now 18 years of age, landed at Weymouth at the head of a body of French troops on the very day of the battle of Barnet. The first event of which she received tidings was her husband's captivity and the defeat and death of Warwick. Nevertheless, she determined to defend to the utmost her fallen fortunes, and with an army commanded by the duke of Somerset made a stand at Tewkesbury, May 4, 1471. Her army was defeated, her son Prince Edward slain, and she herself taken prisoner and held in captivity 5 years, when she was ransomed by the king of France. Her husband was put to death in the tower, May 21. Edward formed an alliance in 1474 with the duke of Burgundy, by which France was to be divided into two states, one of which, comprehending the northern and eastern provinces, should belong to Burgundy, and the other should be possessed by England. He passed over to Calais with a force of archers and men-at-arms, only, however, to be disappointed by the duke of Burgundy, who sent his apology instead of an army, and to make an advantageous treaty with Louis without a battle. By this treaty pensions of considerable amounts were bestowed by Louis not only upon the English king, but also upon all the considerable persons of the English court. Edward returned to England to become involved in a bitter strife with his brother Clarence. The interference of Edward prevented the marriage of Clarence with the wealthy heiress of Burgundy; soon afterward two of the friends of Clarence were put to death upon a frivolous pretence, joined with an accusation of sorcery; and when he maintained their innocence, he was himself privately put to death, Feb. 1478, upon a charge of treason, for arraigning public justice. During the latter part of his life Edward was sunk in indolence and pleasure. He left 5 daughters, of whom Elizabeth was afterward married to Henry VII.; and 2 sons, the ill-fated princes Edward and Richard.

EDWARD V., king of England, of the York branch of the Plantagenets, son and successor of the preceding, born Nov. 4, 1470, in the sanctuary of Westminster abbey, whither his mother had fled for refuge from the army of the Lancastrian Queen Margaret and of Warwick, died doubtless by murder in the tower of London, where he was imprisoned, in 1483. At the time of his father's death, April 9, 1483, young Edward was residing on the borders of Wales, in the care of the earl Rivers, brother of the queen. In company with Rivers he immediately set out for London, while the duke of Gloucester, the brother of the late king, and now the regent during the minority, started for the south from York, attended by a splendid retinue. The two processions met at Stony Stratford, when Gloucester approached the young prince with the greatest demonstrations of respect but soon after charged

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Rivers and the queen's son, Sir Richard Grey, with having aimed to estrange from him the affection of his nephew, arrested and imprisoned them both in the castle of Pomfret, and endeavored unsuccessfully to satisfy Edward with regard to the violence thus exercised upon his kindred. The king was from this time a captive. The queen mother in London, perceiving that nothing less than the ruin of her family was intended, hastily took refuge with her second son, the duke of York, and her 5 daughters, in the sanctuary at Westminster. Gloucester had no sooner arrived in London than he postponed the coronation of the young king, confined him for security in the tower, and was formally invested with the office of protector. His next step was to withdraw the duke of York from his retreat with his mother at Westminster; but he had still to fear opposition on the part of those noblemen, such as Lords Hastings and Stanley, who were friends of the late king, and unswerving in their fidelity to his children. Their destruction or imprisonment without form of trial, or even specification of offence, swiftly followed. The earl Rivers also, and his friends, were put to death without any semblance of judicial forms. The amours of the late king now suggested to Gloucester a means of vilifying the queen dowager and her descendants. He even did not hesitate to malign his own mother, affirming that the resemblance of Edward IV. and of the duke of Clarence to notorious gallants was a sufficient proof of their spurious birth, and that the duke of Gloucester alone, of all his sons, appeared by his features and countenance to be the true offspring of the duke of York. Thus having insulted the memory of his mother and brother, disgraced the queen and her children, and removed their most powerful friends, he openly denied the title of Edward V., who meanwhile, with his brother, languished in prison. The precise time and the details of the death of these princes are among the mysteries of history. A conspiracy had been set on foot for their liberation during the first year of the usurper's reign, when it was announced that they were no longer alive. The account of Sir Thomas More, which was collected from the confession of the murderers in the next reign, is as follows: that Richard had in vain tampered with the governor of the tower, Brackenbury, to put them to death, but found a ready instrument for the execution of his purpose in Tyrrel, his master of horse; that Tyrrel was despatched with a commission to receive the keys of the tower for one night, and that during that night he watched without while one of his grooms, accompanied by a notorious assassin, entered the sleeping room of the princes, stifled them both with feather beds and pillows, and buried their bodies at the foot of the staircase. The testimony of More is almost contemporaneous with the event itself, and is confirmed by the honors which were certainly conferred upon the alleged murderers. In the reign of Charles II., when alterations were made in the tower, there was found at the foot of an old stairway a heap of decayed bones, which proved to be those of two boys. The indications were deemed sufficient that they belonged to the unfortunate Edward V. and his brother, and they were removed by royal command to Westminster abbey, where an inscription, beginning *Ossa desideratorum diu et multum quæsita*, was placed upon the monument. So well concealed a matter as the death of the royal princes leaves room for paradoxes and historic doubts; but it is certain that, though the name of Edward V. stands on the list of English sovereigns, he had hardly the shadow of a reign; that under the dark protectorship of his uncle he went speedily from the palace to the prison, within whose precincts he found secret death and burial.

EDWARD VI., 3d king of England of the Tudor dynasty, born Oct. 12, 1537, ascended the throne in 1547, died July 6, 1553. The son of Henry VIII. and Jane Seymour, he was little cared for by the 3 stepmothers whom he had in quick succession; but at the age of 6 years, being intrusted to the learned masters Anthony Cooke and John Cheke, made progress in philosophy, divinity, Greek, and Latin. Henry VIII. appointed in his will a council of executors to exercise the royal authority during the minority of his son, who, at their first meeting, fearing that the government would lose its dignity for want of some head to represent the royal majesty, bestowed upon Edward Seymour, now created duke of Somerset, or allowed him to assume, the titles of governor of his majesty, lord protector of all his realms, and lieutenant-general of all his armies. The chancellor Wriothesley, who resisted this measure, and who in his zeal exceeded his judicial duties, was compelled to resign his office. Sir Thomas Seymour, the brother of Somerset, was created Baron Seymour of Sudley, and appointed lord high admiral. The government was almost entirely Protestant, and its first object was to complete the religious revolution and establish a church independent of the see of Rome. The statute of the 6 articles was repealed, prisoners under it were released, and exiles recalled. Preaching, which had been rare in Catholic times, was enforced by visitors despatched throughout the kingdom, who with other powers were authorized to require that 4 sermons be preached every year in every church against the papacy. Images, which Luther had tolerated as aids to devotion, and of which Cranmer vindicated a moderate use, became objects of dislike, and were torn down in places where they had been honored by pilgrimages and offerings. The English Bible, with Erasmus's commentary on the gospels, was placed in every church for the use of the people. In the first parliament the statutes of Richard II. and Henry IV. against the Lollards were repealed, together with all the acts in matters of religion passed under Henry VIII., except those directed against the papal supremacy. The uniformity of public worship was established, and all ministers were

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enjoined to use only the book of common prayer, prepared by the primate Cranmer and his brethren, which, after various alterations in the reigns of Elizabeth, James I., and Charles II., continues in use in the Anglican church to this day. The English clergy were emancipated from compulsory celibacy, though it was recommended to them "to live separate from the bond of marriage, for their own estimation, and that they might attend solely to the ministration of the gospel." There were as yet no Protestant nonconformists, but all persons were commanded to attend public worship under pain of ecclesiastical censures, of 6 months' imprisonment for the first offence, 12 for the second, and confinement for life for the third. Bonner, bishop of London, Gardiner, bishop of Winchester, and several others, were deprived of their sees because they could not keep pace with the reformatory movement. The first step toward religious liberty was a distinction, recognized practically though not by canon, between what were supposed to be the essential and the unessential parts of Christianity, and only offences against the former were liable to deadly persecution. Thus, no Roman Catholic suffered death for religion in this reign; but Joan Bocher, commonly called Joan of Kent, was burned for an unintelligible heresy, which denied something, though her words vainly struggled to explain what, concerning Christ. Von Parris, a Dutchman, was also burned for denying the divinity of the Saviour. Among civil occurrences in this reign, the first of importance, after the settlement of the government, was the expedition of Somerset into Scotland to compel the marriage of Mary, the young queen of Scots, to Edward, according to a previous treaty. A bloody encounter, begun between the Scottish and English cavalry at Falside, Sept. 9, 1547, was continued the next day between the entire armies at Pinkie, and ended in the victory of the English protector. He was, however, quickly called home by machinations against him, the young queen of Scots was sent to France, and the war was ended without having effected its object. His brother and rival, Lord Seymour, was committed to the tower, Feb. 25, 1549, and a bill attainting him was brought into the house of lords. This bill was, by the influence of Somerset, who was present in the house to encourage it, passed unanimously within 3 days; and Seymour, without having had an opportunity to defend himself or confront his accusers, was beheaded on Tower hill, March 20. During the next summer formidable insurrections broke out in various parts of the kingdom. The depreciation of the currency during the last reign had been followed by an advance in the price of commodities; at the same time the demand for labor had been lessened and its wages reduced. The new owners of abbey lands had enclosed many of the fields which had formerly been allotted for the common use of the poor inhabitants, and their rapacity was compared with the indulgence of the monks, who had often been the most lenient of landlords. There were armies of insurgents in several counties, but the largest and most violent was in Cornwall, where a tanner named Kett encamped near Norwich at the head of 20,000 men. He repulsed the marquis of Northampton, but was at length defeated and hanged with his principal associates. The protector had incurred odium by what was termed his feeble administration during this rebellion, and also by his lavish expenditures upon his magnificent palace of Somerset house. He had wavered and almost given sanction to the demands of the populace when they were in arms against the royal authority; and had become from a simple knight with a slender fortune the possessor of more than 200 manors and parcels of land in different parts of the kingdom. The discontented lords, directed by Dudley, earl of Warwick, gradually withdrew from court and met in London with bodies of their retainers. The protector, as soon as he received intelligence of their movement, took the king with him to Windsor, and called by proclamation on all faithful subjects to repair to him at Hampton court in arms for the protection of the royal person against a conspiracy. Multitudes of the common people, but scarcely a gentleman, obeyed his summons, and his cause was rendered desperate when the council declared against him. The king was obliged to sanction the vote for his deposition, and he was brought to London and incarcerated in the tower, Oct. 14, 1549. Warwick dissembled for the moment his purpose concerning the prisoner, and was obliged by his position, though a secret Catholic, to favor the cause of the reformation, and, though a rancorous enemy of Somerset, soon to set that nobleman free, and to give his own son in marriage to Somerset's daughter. When, however, Warwick had received the office of lord high admiral, had been raised to the dignity of duke of Northumberland, had become the undisputed chief of the government, and had annihilated the power of Somerset, he was able to proceed further against that duke, who was again committed to the tower in 1551 for treason and for felony, was convicted upon the latter charge, and executed upon Tower hill, Jan. 22, 1552. Warwick next persuaded Edward to make a new settlement excluding his sisters from the succession to the throne, and giving the fatal nomination to Lady Jane Grey, who had been his playmate and companion in studies. Edward sank rapidly after this, and died in the 16th year of his age and the 7th of his reign. His accomplishments were such as to surprise the famous Italian physician Jerome Cardan, who visited him in his last sickness; and for his diary and other compositions he is included by Walpole in his list of royal authors. The literary remains of Edward VI., edited with historical notices and a biographical memoir by John Gough Nichols, were printed in 1859, for the Roxburgh club (2 vols., London).

EDWARD, prince of Wales, surnamed the Black Prince, from the color of his armor, eldest son of Edward III. and Philippa of Hainaut,

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born at Woodstock, June 15, 1330, died June 8, 1376. In his 16th year he accompanied his father in his invasion of France, and he held the nominal command of the largest and most actively engaged division of the English forces in the batte of Crécy, the king giving him this opportunity to "win his spurs." Among the slain in the battle was John of Luxemburg, king of Bohemia, and his crest of 3 ostrich feathers, with the motto *Ich dien* (I serve), was adopted by the prince of Wales, and has always been borne by his successors. In 1356 he gained the victory of Poitiers, in which the French King John was taken prisoner. He returned to England in 1357, the king of France on a splendidly caparisoned charger forming the principal ornament of the cavalcade with which he entered London. In 1361 the king of England united all his dominions between the Loire and the Pyrénées into one principality, and bestowed it upon the Black Prince, with the title of prince of Aquitania. There Pedro the Cruel took refuge from Castile, and young Edward undertook to replace him on his throne. He marched through the valley of Roncesvalles and by Pamplona to the frontiers of Castile, met and defeated Henry of Trastamare on the plains between Navarrete and Najera, was disappointed of the reimbursements which had been stipulated, and returned into Guienne with an exhausted treasury and a shattered constitution. To defray the expenses of his court, perhaps the most magnificent in Europe, and to fulfil his contracts with the troops that had followed him to Spain, he was obliged to impose taxes which made him unpopular with his barons. Summoned in 1369 to answer before King Charles of France to the complaints of his vassals, he replied that he would obey, but at the head of 60,000 men. He appeared in the field, but the French generals avoided an engagement and garrisoned their strong places. He laid siege to Limoges, captured it and reduced it to ashes, and massacred the inhabitants. This was the close of his military career, and by the advice of his physicians he returned to England, where he lingered for 6 years. The Black Prince is portrayed by contemporary writers as the mirror of knighthood and the most heroic of princes. He was married to his cousin Joan, countess of Kent, famed for her beauty, by whom he left one son, Richard, who succeeded Edward III. on the throne of England.

EDWARDES, Lieut. Col. Herbert Benjamin, C. B., an English soldier, born in Frodesley, Shropshire, in Jan. 1820, where his father was rector of the parish. He studied at King's college, London, and having been nominated to a cadetship in the East India company's service, set sail for Calcutta, where he arrived in Jan. 1840, and was immediately attached to the 1st European regiment. In 1845 he was appointed aide-de-camp to the commander-in-chief, Sir Hugh Gough; he was wounded at the battle of Moodkee, Dec. 18; was actively engaged in the victory of Sobraon, Feb. 10, 1846; was appointed 3d assistant to the commissioners of the Trans-Sutlej territory a few weeks later; and in Jan. 1847, was made first assistant to Sir Henry Lawrence, the resident at Lahore, and was charged with collecting the revenue in the N. W. part of the Punjaub. The skill with which he performed this difficult duty, and, without resort to military measures, reduced the lawless tribes of that half subjugated country, at once drew the attention of the Indian authorities toward the young lieutenant; and his conduct in the troubles which followed with the Sikh chieftain Lalla Moolraj soon made his name familiar in every part of England. In April, 1848, Moolraj stirred up a rebellion of the Sikhs, fortified himself at Mooltan, and, aided by the native garrison of a small fort near there, murdered Lieut. Anderson of the Bombay fusileers and Mr. Vans Agnew of the Bengal civil service. At this critical period it was probably the courage and military knowledge of Lieut. Edwardes which saved the British power in the Punjaub. Leaving the town of Leia on the Indus, where he had been employed with a small force in collecting the land tax, he summoned Col. Cortlandt, commanding at Dera Ismail Khan, to come to his assistance, called upon the friendly nabob of Bahawalpoor to take the field, and having effected a junction with Cortlandt, May 20, moved down the W. bank of the Indus at the head of 7,000 men. At the same time 10,000 of the enemy who had marched out to oppose his passage were compelled by the demonstrations of the Bahawalpoor troops to retreat toward the Chenaub, whither Edwardes, having crossed the Indus on the 17th with a small body of infantry, hastened to attack them, leaving Cortlandt to follow as soon as boats could be got for the passage of the rest. Meanwhile Moolraj had defeated the nabob of Bahawalpoor, and Edwardes on reaching the scene of action had to withstand the onset of the whole Sikh army, 12,000 strong, including horse and artillery. After a hard-fought battle, memorable for a gallant charge of the mounted British officers upon the Sikh front, the insurgents were routed by the opportune arrival of Col. Cortlandt, and made their way to Mooltan. In the subsequent siege of that city and its assault after the arrival of Gen. Whish from Lahore, the heroic young officer gained new laurels, but lost his right hand by the accidental discharge of a pistol. For his services he received the local rank of major in the Lahore territories, the East India company voted him an annuity of £100, the court of directors caused a gold medal to be struck in his honor, and he was raised by successive promotions to the rank of lieutenant-colonel. At the end of the war he visited England, was married, was created by special statute an extra member of the companions of the order of the bath, Oct. 20, 1849, published his "Year on the Punjaub Frontier" (2 vols. 8vo., London, 1851), and in 1851 returned to India, where he was appointed commissioner and superintendent at Peshawer, an office which he still holds. After

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the disarming of the troops at this station during the sepoy revolt of 1857–'8, he organized an effective force among the Afghan mountaineers of the frontiers, and was mainly instrumental in preserving the comparative tranquillity of that part of India throughout the rebellion.

EDWARDS, a S. E. co. of Ill., drained to a small extent by the Little Wabash river; area, 200 sq. m.; pop. in 1855, 4,598. Bon Pas creek flows along its E. border, and the Wabash touches it on the S. E. The surface is occupied by forests and fertile undulating prairies. In 1850 the productions were 227,035 bushels of Indian corn, 36,412 of oats, and 1,502 tons of hay. There were 11 churches, and 1,054 pupils attending public schools. The county was named in honor of Ninian Edwards, governor of Illinois territory. Capital, Albion.

EDWARDS, Bela Bates, D.D., an American author, professor in the Andover theological seminary, born in Southampton, Mass., July 4, 1802, died in Georgia, April 20, 1852. He was graduated at Amherst college in 1824, entered the seminary at Andover in 1825, in 1826 was appointed tutor at Amherst, in 1828 was chosen assistant secretary of the American education society, and performed the duties of this office till 1833. His literary and editorial labors were very great and important. From 1828 to 1842 he edited the "American Quarterly Register," which, up to the first date, had borne the name of the "Quarterly Journal of the American Education Society." In 1833 he established the "American Quarterly Observer," which, after 3 volumes, was united with the "Biblical Repository" of Prof. Robinson, which he edited from 1835 to 1838. Of the "Bibliotheca Sacra" he was the editor from 1844 to 1852. In 1837 he was appointed professor of Hebrew in the seminary at Andover; and in 1848 successor to Prof. Stuart in the chair of biblical literature, which office he held till his death. For 23 years he superintended an important part of our periodical literature, and, with the aid of others, produced 31 octavo volumes, monuments of his industry, learning, taste, and talents. He also prepared the "Eclectic Reader," "Biography of Self-taught Men," and the "Missionary Gazetteer." A selection of his sermons, lectures, and addresses, with a memoir by Prof. Park (2 vols. 12mo.), was published in Boston in 1853.

EDWARDS, Bryan, an English historian, born in Westbury, Wiltshire, May 21, 1743, died July 15, 1800. After acquiring a good English education at Bristol, he emigrated to Jamaica in 1759, where a rich uncle gave him the means of completing his studies, and finally made him his heir. He became a prominent member of the colonial assembly, and published in 1784 a pamphlet against the restrictions laid by government on the trade between the West Indies and the United States. He afterward went to St. Domingo, and collected materials for his "Historical Survey of the French Colony" in that island, which was published in 4to. (London, 1797), and was subsequently incorporated in the author's best known work, the "History, Civil and Commercial, of the British Colonies in the West Indies" (3 vols. 4to., London, 1793–1801). This work bears a high character, and gives very minute and varied information. It was reprinted in Philadelphia in 4 vols. 8vo. (1805–'6). A 5th edition, with a continuation to 1796, was published in 5 vols. 8vo. (London, 1819). Mr. Edwards returned to England, took up his residence at Polygon, near Southampton, and from 1796 till his death represented the borough of Grampound in parliament.

EDWARDS, George, "the father of ornithologists," born in Stratford, Essex, Eng., April 3, 1694, died July 23, 1773. He was brought up to trade, but his tastes being developed by the perusal of works on natural history and antiquities, at the close of his apprenticeship he travelled abroad, visiting Holland, Norway, and other parts of Europe, in prosecuting his favorite researches. The fruit of his labors appeared in his "Natural History of uncommon Birds, and of some rare and undescribed Animals" (4 vols. 4to., London, 1743, '47, '50, and '51); to which 3 more volumes were added in 1758, '60, and '64, called "Gleanings of Natural History." This exceedingly valuable work contained numerous plates, with descriptions in French and English of over 600 subjects; in its original form it is very scarce, but several partial editions, abridgments, &c., have been published. Mr. Edwards left a work entitled "Elements of Fossilology," which appeared in 1776.

EDWARDS, John, D.D., a divine of the church of England, born in Hertford, Feb. 26, 1637, died in Cambridge, April 16, 1716. He was graduated at Cambridge in 1661, and soon afterward took charge of Trinity church in Cambridge, thence removed successively to Bury St. Edmund's, to Colchester, and back again to Cambridge. In 1699 he was made doctor of divinity; and from this time he became a voluminous writer, showing himself a subtle and able polemic, and thoroughly versed in ecclesiastical history. He was so decided a Calvinist that he has been called "the Paul, the Augustine, the Bradwardine, and the Calvin of his age;" and such was his abhorrence of Arminianism that he contended, with the old Puritans, that it was closely connected with popery. His published works were very numerous, and they evince extensive learning, deep thought, cogent reasoning, and extraordinary zeal for what are known as the doctrines of grace. The most important of his works are "*Veritas Redux*, or Evangelical Truths Restored;" "Inquiry into four remarkable Texts;" "Discourse concerning the Authority, Style, and Perfection of the Books of the Old and New Testaments;" "Survey of the several Dispensations of Religion;" "Answer to Dr. Whitby's Five Points;" "Animadversions on Dr. Clarke's Scripture Doctrine of the Trinity;" "*Theologia Reformata*; the Body and Substance of the Christian Religion;" several treatises against the Socinians, and a vast number of smaller treatises, pamphlets, &c.

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EDWARDS, Jonathan, an American divine and metaphysician, born at East Windsor, in the colony of Connecticut, Oct. 5, 1703, died at Princeton, N. J., March 22, 1758. He was the first of the sons of Connecticut, the greatest theologian of his century, and the ablest metaphysician of the period between Leibnitz and Kant. Thomas Chalmers of Scotland gave him the palm over Hume, and added: "On the arena of metaphysics Jonathan Edwards stood the highest of all his contemporaries. The American divine affords, perhaps, the most wondrous example in modern times of one who stood gifted both in natural and in spiritual discernment." Sir James Mackintosh says: "This remarkable man, the metaphysician of America, was formed among the Calvinists of New England. His power of subtile argument, perhaps unmatched, certainly unsurpassed among men, was joined with a character which raised his piety to fervor. That most extraordinary man in a metaphysical age or country would certainly have been deemed as much the boast of America as his great countryman, Franklin." Robert Hall's testimony is: "Jonathan Edwards ranks with the brightest luminaries of the Christian church, not excluding any country or any age." Dugald Stewart says: "One metaphysician of America, in logical acuteness and subtilty, does not yield to any disputant bred in the universities of Europe." He was an only son, with 10 sisters, 4 of whom were older than himself. His own father and his mother's father were eminent ministers; he sprung directly from John Warham, the west of England minister who reached America a week or two before Winthrop, settled first in Dorchester, and then with a part of his flock removed to Windsor. The father of young Edwards was distinguished in his day for his knowledge of Hebrew, Greek, and Latin; his mother was a woman of an excellent mind, well cultivated, fond of reading, and of ardent piety. He was trained by his father and his elder sisters for college and to habits of careful study and analysis. The community in which he lived was "remarkably favored by revivals of religion;" and before he was 10 he was much "concerned for his soul's salvation," abounded in religious duties, prayed five times a day in secret, joined with some of his schoolmates to build a booth in a sequestered spot for prayer, and himself had retiring places of his own among the woods. But the boy did not obtain peace of mind; his childhood was troubled "with many exercising thoughts and inward struggles;" and the doctrine of God's sovereignty in choosing whom he would to eternal life and rejecting whom he pleased, used to appear to him like a horrible doctrine. At 10 years old he wrote a paper ridiculing the idea that the soul is material. At 12 he described in a letter to an absent sister "a very remarkable outpouring of the spirit of God" in his native place. "It still continues," he says, "but I have reason to think it is in some measure diminished; yet I hope not much. Three have joined the church since you last heard; five now stand propounded for admission; and I think above 30 persons come commonly a Mondays to converse with father about the condition of their souls." To the power of analysis, Edwards, like "the great master of those who know," *il maestro di color che sanno*, added the power of observation; and when 12 years old, he sent to a European correspondent of his father an account "of the wondrous way of the working of the spider" in the forest, whose habits he had watched, as it seemingly "tacked its almost imperceptible web to the vault of the heavens," and, swayed by the west wind, moved through the air toward the ocean. With proper opportunities he would like Aristotle have become a great natural philosopher. In Sept. 1716, he entered Yale college. His fellow collegians, only 30 in number, dwelt not together, but scattered in clusters among several villages; Edwards for the most part at Wethersfield. He gained a good name for "his carriage and his learning;" but in his scanty opportunities the range of his learning was very limited. He knew little of classic literature; the best impulse to his mind was given by Locke's "Essay on the Human Understanding," which he read with "a far higher pleasure than the most greedy miser finds, when gathering up handfuls of silver and gold from some newly discovered treasure." But he was quickened, not subdued or mastered, by Locke's system, of which the perusal only roused his own faculties to speculative activity and creative reflection. His nature was inclined to that system which in Europe had found its representatives in Malebranche and Leibnitz; and in some way or other, probably from citations, something of Plato's theory of ideas, and something of the doctrine of Cudworth's "Intellectual System," infused themselves into his youthful reflections. At this early period, when about 15, he, in opposition to Locke, denied the possibility of adding to matter the property of thought; and held that "every thing did exist from all eternity in uncreated ideas;" that "spirit or mind is consciousness and what is included in consciousness;" that "truth is the agreement of our ideas with the ideas of God;" that "nothing has a proper being but spirit;" that "matter is merely ideal;" that "the objects of the external senses are but the shadows of being;" that "the universe exists nowhere but in the divine mind." His speculations have sometimes a startling resemblance to those of Spinoza. The latter names thought and extension as the attributes of God, and ascribes being to God alone; Edwards, the collegian, to whom God was Intelligence itself, wrote also that "space is God." In one of his latest works he says of God: "He is all and alone;" "the infinite, universal, all-comprehending entity." In his youth, at 15 or 16, he said: "God and real existence are the same; God is, and there is none else." Spinoza retained till he was past 40 the so-called Arminian theory of the will, and did not adopt that which harmonizes

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with Calvinism till he had separated from the school of Descartes. Voltaire in his early manhood taught Madame du Châtelet the Arminian view, though after 40 years of further experience and reflection he asserted the other theory, confessing candidly of himself: "The ignorant philosopher who thus reasons now, has not always been of this way of thinking." But Edwards, while a collegian of 15 or 16, argued out for himself his theory of the will; and his theory of virtue was also fully formed and declared and written down in words. One thing more was wanting to shape his course. He counted himself still among the unregenerate; but after an illness in his last year in college, when not yet 17, how or by what means he could never tell, "his past convictions" were overcome, and he had no more doubts of "God's absolute sovereignty and justice with respect to salvation and damnation." Now he had found the purpose of his life; his speculative opinions and his religious faith were unalterably formed. He had no less than Locke a disposition to show the harmony between reason and religion, the faculties of man and the dogmas of the true faith; but from the first he repelled the materialist philosophy; and while he never came forward as the express combatant of Locke, it became from his early youth the object of his earthly career to combat the results of Locke's philosophy in its application to the sources of knowledge, the science of morals, and theology. From this moment God's absolute sovereignty became to him a delightful conviction; the doctrine exceedingly pleasant and bright. As he read of the King eternal, immortal, and invisible, a new sense of the glory of the Divine Being was diffused through his soul. He longed to be rapt up to him in heaven. He read and meditated on the beauty and excellency of the person of Christ and the loveliness of salvation by his free grace in the soul. In a calm abstraction from the concerns of this world, he yearned to be in the mountains far from mankind, conversing with Christ. His sense of divine things would often of a sudden kindle up "a sweet burning in his heart." He gave an account of his experience to his father, and became a member of the visible church. Now, as he walked in a solitary place in his father's pasture, he saw the glorious majesty and grace of God in conjunction; gentle majesty, majestic meekness; a high and great and holy gentleness. To him "the appearance of every thing was altered; there was, as it were, a calm, sweet cast or appearance of divine glory in almost every thing. God's excellency, his wisdom, his purity and love, seemed to appear in the sun, moon, and stars; in the clouds and blue sky; in the grass, flowers, trees; in the water and in all nature." He often used to sit and gaze at the moon for a long time; and in the day spent much time in viewing the clouds and sky, to behold in them the sweet glory of God; singing forth with a low voice his contemplations of the Creator and Redeemer. He would watch the thunderstorm, and while thus engaged, or when walking alone in solitary places for converse with God, it always seemed natural for him to chant forth his meditations, or to speak his thoughts in soliloquies with a singing voice. He was satisfied of his good estate, but he longed so vehemently for more holiness, that his soul was breaking for its longing. Prayer was as natural to him as the breath which relieved his inward burnings. With soul-animating and refreshing delight, he saw the divine excellence of the things of God, and tasted their soul-satisfying and life-giving good.—For two years after he took his degree he remained in New Haven as a student for the ministry; and in Aug. 1722, before he was 19 years of age, he was selected to uphold, as a preacher, the cause of Calvinism in a Presbyterian church in the city of New York. Here he remained 8 months, increasing all the time in his sense of divine things. Heaven appeared to him as a world of love; holiness as ravishingly lovely—a divine beauty, of a charming serene nature, bringing purity, brightness, and peace. He would retire into a solitary place on the banks of the Hudson river for contemplation of divine things, hanging a thought on every thorn. Life in the commercial city enlarged his sympathies, and on the arrival of a ship "his soul eagerly catched at any news favorable to the interest and advancement of Christ's kingdom." Here, on Jan. 12, 1723, he made anew a solemn dedication of himself to God. He remained in New York long enough to learn to love the place "where he had none other than sweet and pleasant days;" and when, in April, 1723, he returned home, his parting hour "was most bitter;" his heart seemed to sink within him, and as he sailed away he kept sight of the city as long as he could. At his father's house in East Windsor he continued his severe and unremitting studies, made with the pen in hand. Here, too, he finished a series of 70 resolutions, most of which he wrote in New York. He humbly entreated God by his grace to enable him to keep them all; to act always for the glory of God, for the good of mankind in general; to lose not one moment of time; to live with all his might while he did live; to let the knowledge of the failings of others only promote shame in himself; to solve as far as he could any theorem in divinity he might think of; to trace actions back to their original source; to be firmly faithful to his trust; to live as he would if it were but an hour before he should hear the last trump; to strive every week for a higher and yet higher exercise of grace; "to keep a benign aspect, and to let there be something of benevolence in all his speech." Abounding in spiritual and holy joys, the young "seraphic doctor" of Congregationalism cherished no hope like that of the exercise of holiness and "a burning love to God." It was also a comfort to him to think of that state of fulness of joy where reigns heavenly, calm, and delightful love. "How sweetly," said he, "will mutual lovers

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join together to sing the praises of God and the Lamb." He heard of the wondrous virtues of a child of about 14, and noted them down in this wise: "They say there is a young lady in New Haven who is beloved of that Great Being who made and rules the world, and that there are certain seasons in which this Great Being in some way or other comes to her and fills her mind with exceeding sweet delight, and that she hardly cares for any thing, except to meditate on him; that she expects after a while to be received up where he is, to be raised up out of the world and caught up into heaven; being assured that he loves her too well to let her remain at a distance from him always. There she is to dwell with him and to be ravished with his love and delight for ever. Therefore, if you present all the world before her, with the richest of its treasures, she disregards it, and cares not for it, and is unmindful of any path of affliction. She has a singular purity in her affections; is most just and conscientious in all her conduct, and you could not persuade her to do any thing wrong or sinful if you would give her all this world, lest she should offend this Great Being. She is of a wonderful sweetness, calmness, and universal benevolence, especially after this Great God has manifested himself to her mind. She will sometimes go about from place to place, singing sweetly, and seems to be always full of joy and pleasure, and no one knows for what. She loves to be alone, walking in the fields and groves, and seems to have some one invisible always conversing with her." This young lady was Sarah Pierrepont, daughter of a minister, and like Jonathan Edwards having ministers for her ancestors, among them Thomas Hooker, one of the best of men; one who filled his earthly career with great deeds, and left a free and imperishable commonwealth as his monument. In Sept. 1723, having received at New Haven his degree of master of arts, several congregations invited Edwards to be their minister; but he declined every proposal, reserving 2 years more for study. In June, 1724, he entered on the office of tutor in Yale college; and he and his colleagues are remembered as "its pillar-tutors and glory;" all the while practising ascetic abstinence, not of food only, but of sleep, for the sake of closer diligence. In the summer of 1726 he received an urgent invitation to become the pastor of Northampton, as the colleague of his grandfather, Solomon Stoddard; and on Feb. 15, 1727, in the 24th year of his age, he was introduced to his office. Every omen promised usefulness, honor, and happiness. His residence was in the most beautiful town of New England, where no one can live without imbibing love for the place. The inhabitants were all, even those who were mechanics, engaged in agriculture. The rich soil teemed with abundance; the people were none of them wealthy, but all enjoyed plenty, and the community was affluent. The scenery is as cheerful as it is beautiful, propitious to mental serenity, and there was scarcely another village possessed of so much intellectual culture. It was the shire town of a very large county; the most populous, richest, and happiest town in western Massachusetts. Hardly was the young divine settled with a competent salary, than the thought of Sarah Pierrepont joined itself with his studies and his devotions. "Patience," said he to her in one of his love letters, pleading for an immediate union, "patience is commonly esteemed a virtue, but in this case I think I may almost regard it as a vice." She listened to his urgency, and on July 28, about 5 months after he was settled, the youthful preacher was joined in wedlock at New Haven with the wonderfully endowed bride of his choice. She was pure and kind, and uncommonly beautiful and affectionate, and notable as a housekeeper; he holy, and learned, and eloquent, and undoubtedly the ablest young preacher of his time; she 17, he 23. What was wanting to their happiness? The union continued for more than 30 years; and she bore him 3 sons and 8 daughters. In Feb. 1729, the senior pastor died at the good age of 85, and the young minister of 26 was left with the sole care of the town. Notwithstanding a weakly and infirm constitution, his zeal and industry were equal to every duty. His wife spared no pains to conform to his inclinations, and ministered cheerfully to his comfort, as her greatest glory and best service to God and her generation. She was a good manager; and he carried into the business of life the same thorough exactness which marked his researches. Yet he kept himself as free as possible from worldly cares, giving himself wholly to the work of the ministry; rose early, and employed himself in study all day long. He made no visits unless sent for by the sick or the sorrowing; but encouraged persons under religious impressions to come to consult him on the state of their souls, and they were sure of easy access and tenderness. The little exercise which he took consisted in solitary walking or in rides on horseback among the lonely woods; but his mind was in full action all the time he was abroad, and he would return richly laden with thoughts. His fame spread more and more widely. In July, 1731, he was prevailed upon, notwithstanding "his youth and modesty," to preach the Thursday lecture in Boston; and "divers ministers" found him to be a workman that need not be ashamed before his brethren; printed his sermon; approved his teaching "evangelical principles to the churches notwithstanding all their degeneracies;" and "heartily rejoiced in the special favor of Providence in bestowing such a rich gift on the happy church of Northampton." He gradually obtained universally the character of a good preacher, beyond any one of his times; writing out his thoughts with care, but uttering himself fluently and freely, in words full of ideas, without regard to his notes; above all, adding to his close reasoning and great acquaintance with divinity an inward sense of true experimental religion. His own experience and his rare powers of observation

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gave him great insight into the human heart, and he knew what was in man, both in saint and sinner. His voice, though not strong, was clear and distinct; and his manner, though he used little of gesture, discovered his own fervor and effectually moved the hearts of his hearers. He often had sweet complacency in God and in the excellency of Jesus Christ. The holiness of God appeared to him the most lovely of all the divine attributes. God's absolute sovereignty and free grace, and man's absolute dependence on the operations of God's holy spirit, appeared to him more and more as sweet and glorious doctrines. He loved to adore him as a sovereign, and ask sovereign mercy of him; it seemed "that it would spoil heaven to receive it in any other way." Thus he taught his people the doctrines of the gospel, which were to his soul and theirs like green pastures. He himself in his humility was "as a little white flower, which may be seen in the meadows in the spring of the year, low and humble on the ground, opening its bosom to receive the pleasant beams of the sun's glory; rejoicing as it were in a calm rapture; diffusing around a sweet fragrancy; standing peacefully and lovingly in the midst of other flowers round about, all in like manner opening their bosoms to drink in the light of the sun." To this New England Christian philosopher the village meeting house was the porch of the Academy, and plain country people the pupils who clung to him for views of spiritual glory. What teacher in his widest fame was greater than he? How poor in the comparison was Leibnitz, speaking to the old dowager electress of Hanover, or to the queen of Prussia, or to Prince Eugene! How did the gospel preacher, who declared divine truth, not indeed to the learned, but to the universal heart, rise in dignity above Massillon, pleasing the licentious court of Louis XV. with his beautiful diction; or even Butler, instructing Queen Caroline to fulfil all her parts and bless all her children! Is it strange that Edwards should have thought often of the millennium, or that it should have come into his mind that that happy period was to take its beginning in New England? Edwards shunned always mere speculative questions; but the Arminian doctrine, which made man's regeneration his own work, was regarded by him as of the most dangerous practical tendency. He held mind to be above matter; "the works of God in the conversion of one soul to be a more glorious work of God than the creation of the whole material universe;" and he saw no end to the immoral consequences of that human pride which would claim this greatest work as its own. "The doctrine of men's being the determining causes of their own virtue teaches them not to do so much as even the proud Pharisee did when he thanked God for making him to differ from other men in virtue." Against this pride he opened a war in 1734, begun by discourses on justification by faith alone. His assiduity and power were followed by a wonderful revival of religion; his predecessor had had five harvests, but the harvest of this year and the next exceeded every thing that had been known at any time in any part of the country. It was on this occasion that Edwards printed a sermon on "A Divine and Supernatural Light imparted to the Soul by the Spirit of God;" a performance imbued with his views of the source of knowledge as well as of the regenerating influence of the Spirit. He wrote a narrative of these surprising conversions, which was printed in England, and republished in Boston with some doctrinal discourses against the Arminians. In all his reading, the pleasantest thing to him had ever been to read of the advancement of Christ's kingdom, and his mind was entertained with the Scripture prophecies. In 1737, as he rode in the woods on the Connecticut river, and alighted to walk for divine contemplation and prayer, he had an extraordinary view of the glory of the Son of God, and his full, pure, and sweet grace and love, which kept him for an hour in a flood of tears, weeping aloud. On a Saturday night in Jan. 1739, he perceived so clearly how blessed a thing it is to walk in the way of duty, that it caused him to break forth into loud weeping; for he had an affecting sense how meet and suitable it was that God should govern the world and order all things according to his own pleasure, and he rejoiced in it that God reigned and that his will was done. The fruit of this excitement of mind was, two months after, in March, 1739, the beginning of a volume of discourses on universal history, treating the wonderful series of successive acts and events as the record of God's redeeming providence from the beginning—a conception not less sublime and more full of feeling than that of Bossuet in his "Universal History"—but failing in the execution alike from deficiency and from excess, the want of close knowledge of events, and the disposition to construct out of interpretations of prophecies a narrative also of the future, even to that perfect state of things settled for eternity. In this way years rolled over the eloquent messenger of celestial truth, and he was thoroughly happy. His wife also had the deepest religious experience, as though a glow of divine love came down from the heart of Christ in heaven into her heart in a constant stream, like a pencil of sweet light. A very great revival began to extend far and wide through the New England colonies, a subject of interest and instruction to the world, having, as many think, a permanent influence on the character of the people, fitting them for the great events in their history that were soon to come. Tradition still keeps in memory the wonderful effect of Edwards's sermon at Enfield on sinners in the hands of an angry God. He wrote "Thoughts on the Revival of Religion;" and, after long meditation, he, in 1746, gave to the world his "Treatise concerning Religious Affections," a work full of his spirit, permeated by all his cherished doctrines on morals, and marked by keen analysis of states of mind, which showed his self-possession in the

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midst of the most exciting scenes. No one has better analyzed and described the affections of the human mind under religious influences; and though his style in this work is neither polished, nor concise, nor correct, his characterizations of counterfeit piety are sometimes worthy of the pen of a La Bruyère or a Rochefoucauld. His house was always the home of hospitality. In 1747 he invited the missionary Brainerd, whose life was wasting away with a hectic fever, to come under his roof; and with the exception of a short visit to Boston to consult physicians, Brainerd remained with him, nursed and cared for and comforted, till his death. Meantime war raged between France and England; Edwards's parishioners took an eminent part in the capture of Louisburg in 1745; and it happened in the next year that the night after a day of fasting and prayer, appointed for the colony, and kept most fervently at Northampton, the terrible French "armada," under the duke d'Anville, was finally dispersed, and utterly confounded; "the nearest parallel," said Edwards in his plea for a visible union of God's people in extraordinary prayer, "the nearest parallel with God's wonderful works of old in Moses's, Joshua's, and Hezekiah's time, of any that have been in these latter ages of the world." This trust in Providence never failed him; but his life was now destined to meet with seemingly one of the saddest of afflictions. The New England of that day appeared to grudge a home to its noblest sons, as though resolved that they should elsewhere find their shelter. One of the two greatest had felt himself, while yet a boy, forced to run away; and the other, the Dante of the New England churches, as Osgood of New York rightly calls him, was destined to be driven into exile. The civil tribunals take cognizance of offences against the law; the ecclesiastical courts of the Catholic church exercised a supervision over the inmost actions of the soul. Among the Puritans that power of the keys was taken from ecclesiastical courts, bishops, and priests, and transferred to the several bodies of covenanted believers. The members of each New England visible church exercised a brotherly superintendence over one another, and dealt with those offences of mind or heart of which the laws of the land took no notice. Edwards discerned levities of manner, consequent as it seemed on reading books which a severe morality could not approve, and he invoked the attention of his church to the subject. The church disapproved of the scandal which would follow an inquiry, and let the matter fall to the ground. Here then it appeared that there was some deeper defect; the church, under the lax discipline of Stoddard, had been filled up with persons who, though outwardly well behaved, were not saints by calling. The Catholic church offered bread to the people, the cup only to the consecrated; the reformation established the equality of all believers, and the Lutherans and the Anglican church offered bread and wine alike to all. Calvin and the Congregationalists offered both to every one who partook of either, but confined them both to visible believers, the regenerate, the elect; and baptized only the children of communicants. On this latter system were the churches of Massachusetts and Connecticut originally founded; but the Catholic church from the beginning, and the Lutheran and the Anglican for centuries, had baptized all children born within their pale; and the influence of their example, prevailing more and more after time had enfeebled the passion for dissent, made the New England people generally desire to secure the ordinance of baptism for their offspring. Half-way covenants, and an opening of the church doors to the unregenerate, was the consequence. The half-way system was illogical and superficial, and there was nothing half-way about Edwards. According to the Catholic church, the eucharist was changed into the body and blood of Christ himself; the Lutherans held Christ to be present with and under the elements; but Calvinists held Christ to be present only in the soul of the believer, and therefore there was no place at the Lord's table for the unregenerate, for those who could not ascend in spirit into the presence of Christ in heaven. As the seal of a covenant, the sacrament presupposes conversion. Edwards desired to enforce the rule, which in the Northampton church had been evaded, not abrogated; and the pure-minded, sincere, logical, consistent pastor found himself at variance with a church of seemingly visible Christians, who made no profession of that in which real Christianity was admitted to consist. The pastor would have sanctifying grace go before admission to full communion; the brethren were of opinion that the Lord's supper is a converting ordinance. A Congregational minister is only the moderator of his church; Edwards was overborne by the majority. He proposed to deliver a course of lectures on the subject, and they refused him their consent. After years of difference of opinion, the greatest man in the New England churches was, on June 22, 1750, driven away from his congregation, to which he had devoted the 24 best years of his life; and now, as his decline was beginning, with a wife and 10 living children, of whom but one was provided for by marriage, he was left without any visible means of support. He must quit the scenes that he loved; the groves in which he had meditated; the modest mansion where he had studied; the elm trees which his own hands had planted. Throughout the whole controversy, it is hard to say which was most admirable, the single-hearted humility of Edwards, or his martyr-like firmness; and when afterward he gave an account of his ejectment, he candidly revised his own conduct, and sought to find cause of blame in himself. When the news reached Scotland, his friends there invited him to come over and establish himself in that country; Samuel Davies of Virginia, the same who uttered the famous prophecy about

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Washington, entreated him to remove to Virginia, offering to surrender to him his own parish, and pleading that he and he only had weight enough by his representations in Great Britain to stop the illiberal oppression of Presbyterians by the governors of the Old Dominion. But neither Scotland nor Virginia could offer him a certain provision; and the man whose intellectual endowments were unequalled in the land, had no option but to accept a small offer from the agent of the London society for propagating the gospel to become a missionary to the remnant of Housatonnuck Indians at Stockbridge. The handful of white settlers that had gathered round the tribe also asked him to become their pastor. The trifling income thus obtained was slightly improved by the delicate handiwork of his wife and daughters, which was forwarded to Boston to be sold. It was apparently hard that so wise and great a man should have so limited a sphere of duty; but in truth his sphere was enlarged by his removal, and now embraced the whole English world. A mind like his yearned for intimate intercourse with its kind; at Northampton, Edwards was the centre of a wide circle of influence, visited by many guests, consulted by many churches; at Stockbridge, all his preaching to the Indians was uttered extempore, without notes, aided by an interpreter; and when he was once established in a house of his own, he found himself possessed of more leisure for study than he had ever before enjoyed. The next 6 years of his life were years of uninterrupted study. The narrow apartment that formed his work-room found him early, all the day, and late at his desk; he scarcely shared the meals of his family, except to ask Heaven's blessing on them; and it is the tradition, that while his wife and the children continued at their repast, Edwards would retire to his pursuits, coming out only to return thanks when they had done. The development of the views which had long engaged and swallowed up his mind, formed the chief entertainment and delight of his life. He was happy in these employments. His method of study had ever been by writing; applying himself to improve each important hint, and penning down his best thoughts on innumerable subjects, for his own benefit. But now in his absolute retirement, like a father of the church in the wilderness, his thought was for his fellow men in the world, and his sense of duty cheered him on to undertake for his country and the world a refutation of opinions which, as he believed, were false in themselves, though they were brought forward with an air of triumph as the achievement of superior liberality and discernment. The main point in the discussion between Arminians and Calvinists first engaged him. The topic had been carefully considered by him from the time he was 15 years old, and he had kept minutes of his thoughts during the intervening period; it was therefore with a perfect mastery of the subject that he made it his first object in his seclusion to finish and bring before the world an "Inquiry into the Freedom of the Will." This, written out in a very short period of time, not exceeding 5 months, was published in 1754. While he was engaged in preparation for this work, Aaron Burr, the president of the college of New Jersey, at Princeton, after a three days' personal acquaintance at Stockbridge, married Edwards's third daughter. Distressed and enfeebled by a half year's illness, his partial recovery only sent him into new fields, and he completed a dissertation on "God's Last End in the Creation of the World," which is a picture of his own character, reasoning, and mind. He also wrote a dissertation on the "Nature of True Virtue," in which he embodied the convictions that he had formed in youth, and had carried with him through life, as the very centre and heart of his religious experience and his philosophical reflections. One essay more belongs to this period, in which he touched none but the highest and most momentous subjects; it is the discourse on "Original Sin." But the more he accomplished the more he longed to accomplish, and he took upon his mind and his heart what he himself saw was to be "a great work:" Christian theology in the form of a history; a revision and completion of the history of redemption which he had written at Northampton; a history to be carried on with regard to all three worlds, heaven, earth, and hell. The plan of other treatises crowded also upon his active mind. These studies were interrupted by the death of his son-in-law, the president of Princeton college, and for his successor the trustees of that institution looked to the wilds on the frontier of Massachusetts. They called Edwards from his task of teaching the Housatonnucks to take charge of the central seminary of the country. After some hesitation he consented to accept the invitation, repaired to Princeton, kindled by his presence and his words the liveliest interest among the students, and on Feb. 16, 1758, was installed as president. The small pox was prevailing in the neighborhood; as an act of precaution he was inoculated, took the disease under a malignant form, and had only to prepare to die. To his wife, who was absent, he sent his kindest love; recalled the uncommon union which had so long subsisted between them, and trusted that as their union had been spiritual in its nature, it would continue for ever. "Trust in God, and ye need not fear," were his last words; and then, 34 days after his installation as president, at the early age of 54, all of him that was mortal calmly and without a struggle fell asleep. He was buried at Princeton with every tribute that reverence for his genius and piety could offer. His wife was not long divided from him; his daughter soon joined her husband, who had preceded them all; so that in a week and a year the 4 graves of Edwards, his wife, his son-in-law, and his daughter, were added to the burial place of Princeton.—In considering the writings of Jonathan Edwards, the first thing to be borne in mind is his childlike,

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sincere, unquestioning acceptance of the truth of every word in the Holy Scriptures, of every event recorded there, of every miracle and every prophecy; the actual fall of man, the incarnation, death, resurrection, and ascension of Christ. The next is, the intensity of his attachment to the system of Calvinism as opposed to that of Arminianism; he declares it himself everywhere; if in any thing he departed from its essential principles, it was done without his consciousness, and therefore, according to every rule of interpretation, his words are never to be forced into an antagonism to the reformed confessions of faith. These points being premised, the characteristics of all that Edwards has written are threefold. He looks always to establish the reasonableness of his views. The doctrine of a divine incarnation, for example, approves itself, as he thought, to human reason; and he cites in proof of this the authority of Greeks and Romans, the most philosophical nations of the world. He even refers to the *anima mundi* of Blount and the pantheism of Spinoza. He scoffs at the pretensions of greater liberality put forward by the Arminians, and puts reason and common sense on the side of orthodoxy. In this battle, he was in Europe preceded by Leibnitz, with whose works he was not acquainted, and was followed by Lessing and Kant, who were at all times ready to defend the sternest doctrines of orthodoxy, election, free grace, and eternal punishment, and especially the Trinity. "There is," says he, "no need that the strict philosophic truth should be at all concealed from men, no danger in contemplation and profound discovery in these things. The truth is extremely needful to be known; and the more clearly and perfectly the real fact is known, and the more constantly it is kept in view, the better. The clear and full knowledge of that which is the true system of the universe will greatly establish the doctrines which teach the true Christian scheme of divine administration in the city of God." Least of all would Edwards give up the individual right of free inquiry, for he says: "He who believes principles because our forefathers affirm them, makes idols of them; and it would be no humility, but baseness of spirit, for us to judge ourselves incapable of examining principles which have been handed down to us." In harmony with this principle, and indeed as a necessary consequence of it, his teachings all bear the marks of universality. He knows no scheme of Christianity that is the fruit of time; the Logos took counsel with the Father; the divine administration of which he desired to unfold the character began from eternity and reached forward to eternity. The third great characteristic of his mind is its practical character. His system has in view life and action; he puts aside all merely speculative questions, and while he discusses the greatest topics that can engage the mind of man, he never treats them but because of his overwhelming consciousness of their important bearing on conduct and morals. He never involves himself in sublapsarian or supralapsarian subtleties; he never proposes as a problem the contradictory question, if willingness to be damned must precede hope of salvation; he moves in the real world among his fellow men, and brings theology down from the dim clouds of speculation to the business and the bosoms of the universal people. —It is one of the strangest misconceptions that has ever been uttered about Edwards, that he drew his philosophy from Locke. In the dismal want of books, the essay of Locke was the work which trained him to philosophical meditation; but his system was at its foundation, as well as in every part of its superstructure, the very opposite of the theory of Locke.— On the subject of the origin of ideas, the views of Edwards accord with those of Leibnitz, which in the present day have been in some measure popularized by Cousin. The doctrine that all truth is derived from sensation and reflection he discards as "a low, miserable notion of spiritual sense." "A clear apprehension of things spiritual" he calls by the name of "light," and attributes it not to "the external senses," not to "the inferior powers," but to "a new principle," "the divine nature in the soul." "It is some excellent communication from the divine beauty and glory." "It is the Spirit of God that gives faith in him," were the words of his sermon at the Boston lectnre in 1731; and 3 years later he enforced at large that it is a doctrine of reason, that "a divine supernatural light is immediately imparted to the soul by the Spirit of God." There and elsewhere he teaches that knowledge of spiritual truth cannot be derived from "second causes," from the senses, from flesh and blood; that it is a wisdom not earthly or sensual or natnral, but descending from above; that it is "nearly related to a participation of the Deity;" that it is "a kind of emanation of God's beanty;" that "it is the image and participation of God's own knowledge of himself;" that "it is beyond man's power to obtain this knowledge and light by the mere strength of natural reason," and by natural reason he means the understanding as it deals with knowledge acquired throngh the senses; in a word, that "to see spiritual things depends on the sense of the heart." The term is not well chosen; but by sense of the heart he means what later philosophers mean by intuitive reason; and by "spiritual understanding," that higher faculty which reaches at trnth which is not received by the senses, "and could be produced by no exalting, varying, or compounding of that kind of perceptions or sensations which the mind had before." In like manner he finds the idea of causality "implanted by God in the minds of all mankind." And generally, "there is an infinite fonntain of light and knowledge, and light shines forth in beams of communicated knowledge." "The Spirit bears witness with our spirits." "There is some new sensation or perception of the mind;" "a new simple idea." As a consequence, the contrast of Edwards with Locke and those who came after him appears

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equally in the different manner in which they sought to establish the truth of Christianity. The disciples of Locke's philosophy cling to the historical evidence from miracles as the principal proof of the truth of the Christian religion. Not so Edwards. There have been "lying miracles," and Satan can impress the mind with outward representations; therefore Edwards laid down the principle broadly: "No particular sort of outward representations can be any evidence of a divine power." He scorned to make history the proof of Christianity; for thus men might be "very much of an opinion that it was true," but not have "knowledge" of its truth. "Unless men may come to a reasonable, solid persuasion and conviction of the truth of the gospel, by the internal evidences of it, by a sight of its glory, it is impossible that those who are illiterate and unacquainted with history should have any thorough and effectual conviction of it at all. To have a conviction, clear and evident and assuring, the evidence they can have from history cannot be sufficient, but endless doubts and scruples will remain. If men who have been brought up in heathenism must wait for a clear and certain conviction of the truth of Christianity until they have learning and acquaintance with the histories of politer nations enough to see clearly the force of such kind of arguments, it will make the evidence of the gospel among them immensely cumbersome, and will render the propagation of the gospel among them infinitely difficult. It is unreasonable to suppose that God has provided for his people no more than probable evidences of the truth of the gospel. It is reasonable to suppose that God would give the greatest evidence of those things which are greatest, and the truth of which is of the greatest importance to us. But it is certain that such an assurance is not to be attained, by the greater part of them who live under the gospel, by arguments fetched from ancient traditions, histories, and monuments. There is not the least reason to suppose that one in an hundred of those who have been sincere Christians, and have had a heart to sell all for Christ, have come by their conviction of the truth of the gospel this way. Many of them lived and died in times wherein those arguments for the truth of Christianity from antiquity and history had been but very imperfectly handled. And indeed it is but very lately that these arguments have been set in a clear and convincing light, even by learned men themselves. And since it has been done, there never were fewer thorough believers among those who have been educated in the true religion; infidelity never prevailed so much in any age as in this, wherein these arguments are handled to the greatest advantage. The true martyrs, as the very name of martyrs or witnesses implies, are witnesses who can and do testify that they have seen the truth of the thing they assert, having had the eyes of their minds enlightened to see divinity in the gospel, or to behold that unparalleled, ineffably excellent, and truly divine glory shining in it, which is altogether distinguishing, evidential, and convincing. So that they may truly be said to have seen God in it, and to have seen that it is indeed divine; and so can speak in the style of witnesses. The gospel of the blessed God does not go abroad a begging for its evidence so much as some think; it has its highest and most proper evidence in itself."—The theory of Edwards respecting providence corresponded with that of Leibnitz, and varied from that of the school of Locke, which Leibnitz so pointedly condemned. To Edwards the laws of nature were not established and left to themselves, but were the methods according to which God continued his "immediate influence." "God does by his immediate power uphold every created substance in being." "Their existence in each successive moment is the effect of his immediate agency, will, and power." "His preserving created things in being is equivalent to a continued creation."—To express the intensity of his faith in the absolute sovereignty of God, Edwards never could find words of sufficient force. Not Calvin himself could adopt the doctrine more completely and unreservedly. The presence of moral evil, the depravity of human nature, he considered from two points of view. He raised his mind to the contemplation of God as the Creator, and had then no theory to offer for man's depravity but the divine will. He never presumed to ask Almighty God why it was so. To him it was an ultimate fact, the evident act of infinite power; he never undertook to arraign God at the bar of human reason, and plead before men for a verdict of acquittal for the Almighty. But to those who questioned this absolute sovereignty, and rejected it as a doctrine full of horror, he made a twofold answer, not as finding excuses for the Creator, but subjectively as shutting the mouth of cavillers: first, that man's depravity is an unquestionable fact; that through the medium of his senses and merely animal organization man can attain to no knowledge of God and no spiritual perfection; and those who cannot solve the difficulty must get over it by acknowledging the weakness and scantiness of their understandings. Secondly, Edwards also set forth the unity of the race; its common constitution as branches from one root, forming one complex person, one moral whole: "Adam and his posterity were one;" which is also the view of Augustine and Calvin, the faithful interpreters of Paul of Tarsus. This view also had a most important bearing on the theory of morals.—The momentous question of man's relation to moral evil, and the way of his escape from it, formed one of the chief objects of Edwards's thoughts during his whole life. "Men in a very proper sense may be said to have power to abstain from sin, because it depends on the will;" and if they will not, the defect is in themselves. A man's evil disposition may be as strong and immovable as the bars of a castle. The law of causality extends to every

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action. Liberty consists in the power of doing what one wills; and the power of willing belongs to the man or the soul. The cause of an action is complex. The volition follows the greatest seeming good; and what shall seem to a man the greatest good depends on the state of his soul. Liberty is to be sought for, not in the act, but in the man; and if a depraved nature is to abstain from sin, it can only be effected by a change of heart. This theory Edwards asserted by an appeal to the facts of universal experience, and by a most thorough, complete, and unanswerable analysis of the complex cause of action. All the while that he was engaged in this most severe demonstration, the seemingly stern doctrine appeared to him as involving man's dignity and worth, and his abstruse reasoning was answered by a flood of perfect melody in his heart.—From the consideration of the will, the transition is natural to the theory of virtue; and Edwards finds it to consist in love—not in love as resting complacently on its objects, but in love as the ruling motive of the will; love in action, benevolence. A knowledge of divine things comes from the divine in man; as justification comes of faith, so virtue has its perennial spring within the soul. And this love is not for self; the doctrine of Edwards is the intensest protest against the theory of self-love. He raises the soul to the highest point of contemplation, takes it as it were to be present at creation, and bids it love actively all that is, universal being, the all-comprehending entity of God; so that the virtuous man, with holy love sanctifying his will, is sent forth joyously for action, action, and still for action, as God's own soldier and servant. Thus virtue includes right reason, holiest love, and action; a rational motive, warmed by love, and bearing fruits of righteousness. The view is not an eccentric one in Edwards's system; it lies at its heart. It appears in his college manuscripts; it colors a half dozen of the resolutions which he formed at 20; it runs through his treatise on the affections; it reappears in his essay on the end of God in creation. It must be accepted, or Edwards himself cannot be accepted. It enters too deeply into all that he has written to be set aside as no essential part of him, and must be explained and developed in connection with the sum of all his doctrines. The test of a theory is that it embraces and absorbs all that is good and true in other theories on the same subject; the rod of the true prophet swallows up all the rods of his opposers. Does virtue imply the love of God with all the soul? This is exactly the doctrine of Edwards; for God is the Being of beings, "in effect, *Being* in general." Does it consist in respect for the moral fitness of things? That moral fitness lies impressed on the universe which perfect moral power has created. Does it consist in the avoiding extremes? The universe of being is moderated by the divine law, and is ever giving the lesson of just order and proportion. Does it consist in regard to truth? And where is truth to be found but in the world that God created, and in the Being of beings himself? Does it rest on sympathy? But nothing so certainly and universally commands sympathy as a spirit that is in harmony with the whole system of God's providence. The love to universal Being includes all being, each in its degree, according to its amount of existence; active love for the good of the world of mankind before the love of country, of country before that of a single city, of a city before a family, of the family before the individual, of the individual only in subordination to the great system of the whole. The theory is directly at war with the system of self-love as the foundation of moral order, or a respect to happiness as the only good; for where self-love is made the root, it grows to be inordinate, and is at war with the being of the whole. But every man, into whatever career of enterprise he goes, may take Edwards along with him in all his course of prosperity, if he will but seek that alone which is in harmony with the greatest good, and keep every passion and inclination subordinate to the divine will. Least of all would Edwards, whose whole theory is one of love, weaken the bonds of family affection; only the love of wife or husband, parent or child, must not be the paramount motive; the wife must cheer her husband to do his duty, even though he is called upon to become a martyr; the father may bless his son, who goes forth to battle for his country's freedom, or as a missionary defies the danger of foreign climes to diffuse the knowledge of pure religion. On Edwards himself the effect of this theory is apparent in a wonderful tenderness toward every thing, a compassion for human frailties, a candor of judgment that mirrored the purity of his soul. Viewed in this light, the doctrine of the oneness of the race, which Edwards asserted with greater clearness and force than the modern school of philosophers who have so much to say of the *solidarité* of humanity, gains new significance, as may be seen, not altogether without excesses, in the writings of his followers.—The ethical theory of Edwards is cosmical; no one was ever more so. His manner of contemplating the universe was also cosmical. It embraced more than the whole course of time, and all as one work; universal history resting on the principle of the redemption of the world, decreed from all eternity; a history of the gradual progress and advancement of the race through the presence of the Divine Word and its ever approaching triumph over all its enemies. Events seem confused like the work of an architect, who employs many hands in many kinds of labor at once; but a knowledge of the design removes all appearance of confusion; and so the design of the Divine Word in redemption gives unity to the history of all the nations of the earth. The development of this idea employed the latest thoughts of Edwards. He left his work unfinished; but the sketch shows how completely he considered universal history as the record of God's providence, and the con-

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turies as a progressive series; tumults and revolutions following one another from age to age, only to bring forth truth and holiness, so "that all things should be shaken until that comes which is true and right, and agreeable to the mind of God, which cannot be shaken," and victory be brought to pass by "a gradual progress," "very swiftly, yet gradually." Every error of opinion and superstition must be abolished. "Well may we admire," says Edwards, "the greatness of this building of God, which he builds up age after age." "All the revolutions in the world are the sum of God's works of providence." "The work of the new creation is more excellent than the old; so it ever is: when one thing is removed by God to make way for another, the new excels the old." "The events of providence seen in this light appear an orderly series of events, wisely directed in excellent harmony and consistence, tending all to one end. The wheels of providence are not turned round by blind chance, but they are full of eyes round about, as Ezekiel represents, and they are guided by the Spirit of God; where the Spirit goes they go; and all God's works of providence through all ages meet in one at last, as so many lines meet in one centre. It is with God's work of providence as it is with his work of creation: it is but one work—one regular scheme. There are many stones, many pieces of timber, but all are so joined and fitly framed together that they make but one building; they have all but one foundation, and are united at last in one top stone. God's providence may not unfitly be compared to a large and long river having innumerable branches, beginning in different regions, and at a great distance one from another, and all conspiring to one common issue."—The sum of the whole is that Edwards makes a turning point in the intellectual, or, as he perhaps would have called it, the spiritual history of New England. Calvin had risen up to battle against mediæval superstitions and mediæval aristocracies; a plebeian, or to use his own word, "*homunculus*," introducing thorough republican reform; for outward penance substituting purity of heart; for hierarchy and laity, the equality of believers. Setting himself up over against the privileged classes, he, with a loftier pride than theirs, revealed the power of a yet higher order of nobility, not of a registered ancestry of 15 generations, but one absolutely spotless in its escutcheon, predordained in the council chamber of eternity. But here in the forests of America there was no danger of exile, imprisonment, and fire; there were no persecutions to defy, no oppressive authority to combat. The time was come when two other of the original component elements of Calvinism should receive their development. The faith condensed in the symbols of Calvinism demanded to be subjected to free inquiry, and, without "dodging, shuffling, hiding, or turning the back," to be shown to be in harmony with reason and common sense. Predestination ceased to be the doctrine that best nourished the spirit of patriotism and liberty; and in the free, peaceful, and happy homes of the New England yeomanry, it yielded the justly due precedence to that principle of active "love, which is the comprehension of all true virtue." The great representative of this period of transition is Jonathan Edwards. New England and New Jersey, in the age following Edwards, applied more thought to the subject of religious philosophy and systematic theology than the same amount of population in any other part of the world; and his influence is discernible on every leading mind. Bellamy and Hopkins were his pupils; Dwight was his expositor; Smalley, Emmons, and many others were his followers; through Hopkins his influence reached Kirkland, and assisted to mould the character of Channing. Edwards sums up the old theology of New England, and is the fountain head of the new. The toils of a century turned the wilderness, to which men had been driven for liberty to say their prayers, into a garden of plenty, peace, and joyous activity; he that will trace the corresponding transition of Calvinism from a haughty self-assertion of the doctrine of election against the pride of oppression to its adoption of love as the central point of its view of creation and the duty of the created; he that will know the workings of the mind of New England in the middle of the last century, and the throbbings of its heart, must give his days and nights to the study of Jonathan Edwards.—There are several lives of Jonathan Edwards; the most interesting is that by Hopkins, who was his pupil; the fullest is that by Sereno Edwards Dwight. There have been two editions of his works in England, one in 8 vols. 8vo. and one in 2 compact volumes. The American editions are to be preferred. One was published at Worcester, Mass., edited by Samuel Austin, in 1809, in 8 volumes. The New York edition is by Sereno E. Dwight, in 10 vols. 8vo., of which the first contains the life. There is also a later and convenient New York stereotype edition in 4 volumes, of which there have been numerous impressions.

EDWARDS, JONATHAN, D.D., president of Union college, Schenectady, son of the preceding, and like him distinguished as a metaphysician and theologian, born in Northampton, Mass., May 26, 1745, died in Schenectady, N. Y., Aug. 1, 1801. At the age of 6 years he went with the family of his parents to Stockbridge, where there was but one school, and that common to the children of both the Indians and white inhabitants, of the latter of whom there were so few that he was in danger of forgetting the English tongue. He so thoroughly learned the language of the Stockbridge Indians, that, as he tells us, all his thoughts ran in their dialect; and though its pronunciation was extremely difficult, the natives acknowledged that he had acquired it perfectly, which, they said, had never before been done by any Anglo-American. This knowledge of their language he retained through life, and in later years pub-

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lished his celebrated treatise on the subject, which led Humboldt to say that if he had not been the greatest theologian, he would have been the greatest philologist of his age. In his 10th year he was sent by his father, with the Rev. Gideon Hawley, among the Six Nations, that he might also learn their language, and become qualified to be a missionary among them. Here he made rapid progress, and became a general favorite; but owing to the disturbances of the French war, he remained but a few months, when he returned to Stockbridge. In 1761 he entered the college at Princeton, N. J., where he was graduated in 1765. After leaving college he studied divinity with Dr. Bellamy, and in 1776 was licensed as a preacher of the gospel. In 1767 he was appointed tutor in the college at Princeton, and soon after accepting this office, which he held 2 years, was chosen to the professorship of languages and logic, which he declined. In 1769 he was ordained as pastor of the church in White Haven, in the town of New Haven, Conn., where he continued till May 19, 1795. Resigning this charge, mainly on account of difference in doctrinal views between himself and some of his people, he was settled in 1796 as pastor of the church in Colebrook, where, in addition to professional duties, his time was devoted to his favorite studies, and to an extensive correspondence which he had long carried on with learned men both in this country and in Europe. In May, 1799, he was elected president of Union college, and entering on the duties of this office, he gave himself with unwearied diligence to the instruction of the students, and to all that might advance the prosperity of the institution, for the 2 remaining years of his life. There were several remarkable coincidences in the lives of Dr. Edwards and his father. They were similar in character and structure of mind. Both were early distinguished for their love of study, and were tutors for equal periods in the colleges where they were respectively educated. Both, after having been settled in the ministry, were dismissed on account of their doctrinal opinions, and were again settled in retired places, where they had leisure to prepare and publish their valuable works. Both were called from these situations to be presidents of colleges, and both died, shortly after their respective inaugurations, one in the 55th and the other in the 57th year of his age, each having preached on the first Sabbath of the year from the text: "This year thou shalt die." Dr. Edwards was a man of great acuteness, strength, and comprehensiveness of intellect, and profoundly skilled in the philosophy of the human mind. His complete works, edited with a memoir of his life by his grandson, the Rev. Tryon Edwards, D.D., were published in 2 vols. at Andover in 1842.—Jonathan W., a lawyer, the only son of the preceding, born in New Haven, Conn., Jan. 5, 1772, died in Hartford, April 3, 1831. He was graduated at Yale college at the age of 17, and was afterward tutor in the same institution. On taking his second degree, he delivered an oration, in which he attacked the existing law by which the eldest son received a double portion of the estate of the father, if the latter died intestate. This excited so much attention throughout the state, that at the next meeting of the legislature the obnoxious law was repealed. Having studied law at Litchfield, he settled at Hartford, where he rose rapidly in his profession, and soon became widely known as a profound lawyer and distinguished advocate. Unremitting application to his profession so impaired his health that he early retired from public life.—Tryon, D.D., an American clergyman and author, son of the preceding, great-grandson of the first and grandson of the second President Edwards, born in Hartford, Conn., Aug. 7, 1809. He was graduated at Yale college in 1828, and after studying law in New York, and theology at Princeton, settled in the ministry at Rochester, N. Y., in 1834. He removed his pastoral relations in 1845 to New London, Conn., his present residence. In 1832 a prize tract on Sabbath schools appeared from his pen, and he has from that time contributed constantly and in various forms to the religious press. Among his publications are an address delivered at Williams college in 1841, entitled "Christianity a Philosophy of Principles;" a memoir of the younger President Edwards, published with his complete works (1842); "Self-Cultivation" (1843); and a memoir of Dr. Bellamy, published with his complete works (1850). He has edited, beside the works of the younger President Edwards, a volume entitled "Charity and its Fruits," from the MSS. of the elder President Edwards, and several collections designed especially for domestic culture, as "Select Poetry for Children and Youth" (1851); "Jewels for the Household" (1852); the "World's Laconics" (1852); and "Wonders of the World" (1855). Several of these books have passed through many editions, and have been republished in England. Dr. Edwards has been a frequent contributor to the "Christian Spectator," "New Englander," "Biblical Repertory," "Biblical Repository," and other periodicals of note, and was for many years editor of the "Family Christian Almanac."

EDWARDS, Justin, D.D., an American clergyman, born in Westhampton, Mass., April 25, 1787, died at Virginia Springs, July 23, 1853. He was graduated at Williams college in 1810, settled in the ministry at Andover in 1812, removed thence to the Salem street church, Boston, in 1828, and in 1829 resigned this charge to become secretary of the American temperance society, in the service of which he was engaged for 7 years, presenting its cause with great ability and success, by lectures and addresses, in every part of the land, and preparing the well-known "Temperance Documents." After this, he was for 6 years president of the Andover theological seminary, and then for 7 years engaged in promoting the observance of the Sabbath, writing the "Sabbath Manual," &c. He then spent 4 years in pre-

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paring a brief commentary on all the New and part of the Old Testament, for the American tract society, before finishing which he was called from his earthly labors. Dr. Edwards was the author of several valuable tracts on moral and religious subjects, some of which have had a wide circulation. Of his "Temperance Manual," some 200,000, and of the different parts of his "Sabbath Manual," about 1,500,000 copies have been published. A memoir of his life and labors, by the Rev. Dr. Hallock, was published by the American tract society in 1855.

EDWARDS, MILNE. See MILNE-EDWARDS.

EDWARDS, RICHARD, one of the earliest English dramatists, born in Somersetshire in 1523, died in 1566. He was educated at Corpus Christi college, Oxford, where he obtained distinction for scholarship, and became under Elizabeth one of the gentlemen of the queen's chapel, and had charge with others of the theatrical representations before the children there. His "Damon and Pythias" was the first English tragedy on a classical subject, and was acted before the queen at Oxford in 1566. Though he was esteemed among the best writers of interludes and rude comedies of the time, all his other dramas are lost. He wrote several minor poems, one of which, entitled *Amantium Iræ*, has been often reprinted in modern collections.

EDWIN, king of Northumbria, born in 586, ascended the throne in 617, died in 633. He was but 3 years old when at the death of his father the throne was usurped by Edilfrid, and he himself was placed by his friends under the protection of Cadvan of North Wales. The British prince was assailed by the Northumbrian, and the two armies met in the vicinity of Chester. Victory decided for Edilfrid, and a body of monks who had stationed themselves on a neighboring hill to deprecate the success of the invader were put to the sword, and the great monastery of Bangor, containing 2,100 monks, was demolished. Edwin then wandered through the different principalities of the Britons and Saxons, till he found an asylum at the court of Redwald, king of the East Angles. Redwald made war on Edilfrid; the armies met in 617 on the banks of the Idel, in Nottinghamshire; Edilfrid was defeated and slain, and Edwin without further opposition ascended the throne. The martial genius of Edwin raised Northumbria to preëminence among the Anglo-Saxon states. The islands of Anglesea and Man became subject to his authority, all the princes of the Britons paid him tribute, and among the Saxon kings Eadbald of Kent alone retained a nominal independence. So inflexible was his administration of justice, that in his days it was a common saying that a woman or child might openly carry everywhere a purse of gold without danger of robbery. The chief event of his reign was the introduction of Christianity into the kingdom of Northumbria. He married Edilberga, a princess of Kent, daughter of that Bertha by whose influence the king and people of Kent had been already converted to Christianity. Yet neither the entreaties of the young queen, the arguments of the learned bishop Paulinus, nor the letters and presents of Pope Boniface V., could for a long time turn him from the worship of his fathers. He consulted alternately the priests on either side, revolved in solitude their opposite arguments, assembled the witenagemote for consultation, was strongly influenced by his many successes, which Paulinus ascribed to the favor of Christ, and at last avowed himself a convert, and was followed by his people. Edwin perished in a disastrous battle with the combined armies of Penda, king of Mercia, and Ceadwalla, king of the Britons, who had raised the standard of rebellion, and marched into Yorkshire. Previous to this reign the northern metropolitan of the Anglo-Saxon church had been directed to fix his residence at York, and Paulinus, who held this office, received from the king a house and other possessions in that city.

EDWY, surnamed the Fair, a king of the Anglo-Saxons, son of Edmund I., and successor of Edred, born about 938, ascended the throne in 955, died in 959. He was of a passionate character, and according to the monks, who are the only historians of his reign, of dissolute manners. Having on the day of his coronation retired from the banquet to the apartment of a young princess named Elgiva, he was violently taken back to the table by St. Dunstan. The affront was one not to be forgiven, and Dunstan was banished from the kingdom. Archbishop Odo, however, broke with an armed force into the villa where Elgiva resided, defaced the beauty of that lady with brands, and exiled her to Ireland. She subsequently returned to England, where she suffered hamstringing and died. It is in dispute among historians whether Elgiva, who was within the prohibited degrees of consanguinity, was the wife or mistress of Edwy. The English favored the ecclesiastics rather than the king, and a rebellion broke out under Edgar, a younger brother of Edwy, who was chosen king by the Mercians. Edwy was obliged to flee beyond the Thames, and the civil war was ended in 957 by a general meeting of the thanes, who determined that that river should be a boundary between the dominions of the two brothers. Edwy governed his portion, which consisted of Wessex and Kent, in peace and to the satisfaction of his subjects till his death.

EECKHOUT, or ECKHOUT, GERBRANT VAN DEN, a Dutch painter, born in Amsterdam, Aug. 19, 1621, died there, July 22, 1674. He was one of the pupils of Rembrandt, and in some measure successful in imitating his manner, especially in the early part of his life. He excelled chiefly in painting portraits, and these as well as his historical pictures abound in the best collections of Holland, while several of them are to be found in Germany. His most esteemed work represents Christ among the doctors.

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EECLOO, or Ecclo, a town of Belgium, in the province of East Flanders, 11 m. from Ghent; pop. in 1856, 8,837. It has an active industry and commerce in woollen fabrics, hats, tobacco, and oil, and is the most important grain market in the province.

EEL, a name applied to several malacopterous fishes of the families *anguillidæ*, *congeridæ*, and *muræniдæ*, especially to the typical genera *anguilla* (Cuv.), *conger* (Cuv.), and *muræna* (Thunb.). From their snake-like appearance, and the absence of ventral fins or posterior limbs, they have been called anguiform *apodes;* they all have the body more or less elongated and cylindrical, no ribs in the skeleton, a cæcal stomach, and simple not-jointed fin rays. In the genus *anguilla*, to which the common eel belongs, the scarcely apparent scales are cycloid, narrow, oblong, arranged in groups at right angles to each other, forming a kind of lattice-work under the cuticle; the whole skin is soft and slimy, thickly studded with muciparous glands and ducts; the nostrils are double, each having 2 orifices, the anterior prolonged into a tube, and the posterior opening above the mouth; the teeth are card-like or villiform in both jaws, and a few on the anterior part of the vomer; the gill-opening on each side is very small, and just in front of the pectoral fin, which exists in all the species; the dorsal fin begins at a considerable distance from the head, and behind the pectorals, and forms a continuous fin with the caudal and anal; the lower jaw is longer than the upper. There are about 50 species described. The common eel of the northern and middle states (*A. Bostoniensis*, Lesueur, and *vulgaris*, Mitch.) is greenish or olive-brown above, and yellowish or yellowish white beneath, often with a reddish tinge along the anal fin; in a specimen 2 feet long, measured by Dr. Storer, the short pectorals were about 8 inches from the end of the snout. The eel inhabits both salt and fresh water, from the British provinces to the southern states, wherever it can find its favorite muddy bottoms and extensive flats; it prefers shallows near the shore, where it may be caught in great numbers by hook and line, by bobbing, and by spearing; the places frequented by it are called eel grounds, in which during the winter the fishes bed themselves in the soft mud to the depth of about a foot, and are then speared through holes cut in the ice; the best time for catching them is at night, by torch-light. During their passage up and down rivers they are taken in baskets and pots baited by fish or any decaying matter. The eel is very voracious and quite omnivorous; when in good condition it is a well-flavored fish, though, from its snake-like appearance (and it is only in form that it resembles a snake), most persons are prejudiced against it. The length varies from 6 inches to 2½ feet; in summer it is sometimes seen weighing several pounds. At the mouths of the rivers emptying into Boston harbor eels are caught in nets, 15 or 20 bushels at a time, and are kept alive until wanted for market in ditches supplied by the tide. In Feb. 1858, at Harwich and the neighboring towns on Cape Cod, the principal part of the male population were engaged in eeling; the fish were obtained by spearing through the ice; in a single bay, and on one day, 200 men speared 100 bushels, or 1,200 dozen; such as were not consumed in the town were sent, packed in ice, to Boston, New York, and other cities, where they were readily sold. The silvery eel (*A. argentea*, Les.) is silvery gray, darker above, and satiny white below; the pectorals are nearer the head than in the common species, of which, however, it is considered by some only a variety; it is taken in pots in October, when it leaves the ponds. A large species, caught in the lakes of western New York, is the beaked eel (*A. rostrata*, Les.); the snout is elongated and pointed; the upper parts are olive-gray, sometimes slaty blue, and the lower parts white; the dorsal and anal fins reddish; length about 2 feet. The common eel of Europe (*A. acutirostris*, Yarrell) has a sharper snout than ours; it is highly esteemed as an article of food, and the London market is supplied principally from Holland, from which the eels are brought alive in vessels carrying each from 15,000 to 20,000 lbs. Eels are much esteemed in other countries, especially, according to Ellis, in Polynesia, where they are often tamed and fed until they attain an enormous size. The attention of fish breeders might be very profitably directed to this family; they are numerous, prolific, hardy, easily preserved in salt, fresh, and brackish water, and will always find a ready sale. Eels are described as making 2 migrations annually, one in autumn to the sea, the other in spring or summer from the sea to the rivers. They are not found in arctic regions, nor in the rivers of the extreme north of Europe; even in temperate regions, at the approach of winter, they bury themselves in the mud, remaining torpid until spring; they remain without food, breathing hardly at all, at a low animal temperature, and almost motionless; yet the irritability of the muscular fibre is very great, as is shown by the restless motions of eels during thunder storms, and by their well-known movements after the skin has been removed. Though not possessing the respiratory pouches of the anabas (see Anabas Scandens), the eel is able to survive a long time out of water, simply because the gills remain moist from the small size of the branchial orifices; by this means it traverses considerable distances on land, moving like a snake through the grass; in this way is explained the appearance of eels in fish ponds from which the utmost care has been taken to exclude them, on account of their destruction of the spawn and young of more valuable fishes; they have been often seen performing such overland journeys at night. Eels are found in fresh water which has no communication with the sea; having a capacious air bladder, they are able to ascend rapidly to the surface, and sometimes swim very high in deep

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water; though slow of growth, they attain a large size under favorable circumstances, having been caught in England weighing 27 lbs. The town of Ely is said to have been so named from the rents having been formerly paid in eels, the lords of the manor being annually entitled to more than 100,000; Elmore, on the Severn, was so called from the immense number of these fish there taken.—The conger eels differ from the genus *anguilla* in having the dorsal fin begin nearer the head, at or even in front of the pectorals, and in having the upper jaw the longer; the anterior nostrils open by short tubes close to the end of the snout, and the posterior in front of the large eyes; the teeth of the palate and vomer are slender, with chisel-shaped crowns, and closely arranged; the skin is naked and scaleless, and the tail elongated and pointed; in other respects they resemble the common eel. The American conger (*conger occidentalis*, De Kay) is olive-brown above and whitish below; the dorsal and anal fins are transparent with a dark border; the lateral line is distinct, with a series of white dots; it grows to a large size, from 3 to 5 feet in length, and either this or another species is found from the gulf of St. Lawrence southward as far as the coast of New Jersey. The European conger (*C. vulgaris*, Cuv.) is common on the coast of Cornwall, on the eastern rocky shores, and in banks off the coast of France; it is caught on lines, the best bait being the sand launce (*ammodytes*) or the pilchard, and the fishing is performed at night; great numbers are taken, and meet with a ready sale at a low price to the poorer classes, but it is not held in much estimation. Congers are very voracious, and acquire a large size; specimens have been caught weighing 130 lbs., more than 10 feet long, and 18 inches in circumference; they are very strong, bite sharply, and have great tenacity of life. As many as 156 vertebræ have been found in the conger, about 40 more than are found in the eel; they spawn in December and January. Sir John Richardson alludes to 9 species.—The eel of the Mediterranean, so famous in the days of ancient Rome, belongs to the genus *muræna*, characterized by the absence of pectorals, smooth and scaleless skin, small lateral branchial orifice on each side, and the united dorsal and anal fins, low and fleshy, hardly distinguishable beyond the margin of the body; the teeth are arranged in a single row around the edge of the nasal bone, with a few on the longitudinal median line. More than 20 species are described, attaining the size of 4 or 5 feet; one (*M. moringa*, Cuv.) was found by Catesby at the Bahama islands. The classic species of the Mediterranean (*M. Helena*, Linn.), the Roman *muræna*, grows to the length of 4 or 5 feet; the color is a purplish brown, marked with sub-angular yellow markings, and spotted with beautiful shades of yellow, purple, golden yellow, and white; the anterior nostrils open near the end of the snout, the posterior just above the eyes; the cheeks are rather tumid from muscular development. It has been caught on the English coast, but it abounds in the Mediterranean; great numbers were consumed by the ancient Romans, who kept them in ponds, and even placed them alive on the table in crystal vessels that the guests might admire their beautiful colors before they were cooked. Cæsar is said to have distributed 6,000 of these fishes among his friends on the celebration of one of his triumphs. They are very voracious and fierce, and are said sometimes to have been fed on the flesh of slaves who had offended their Roman masters. They are fished for with strong lines, and their bite is much dreaded by the fishermen; they are very tenacious of life. The flesh is white, delicate, and much esteemed. There are many species, exclusively marine.—The sand eel (*ammodytes Americanus*, De Kay) has an elongated, slightly compressed body, large gill-openings, a dorsal fin extending nearly the whole length of the back, and an anal fin of considerable size, both separated from the caudal; the lower jaw the longest; the color is yellowish or bluish brown above, mixed with silvery and light green; the sides and abdomen are silvery; the length is from 6 to 12 inches. This species is found from the coast of Labrador to that of New York; in the provinces it is largely used as bait for cod; it is very common in Long Island sound from May to November, constituting in its season the principal food of the bluefish and bass; it is also eaten by eels, and other fish; the cephalopod cuttle fish preys upon it extensively; like the tropical flying fish, it is pursued by fishes in the water, and by gulls and terns in the air. The names of sand launce and *ammodytes* are given to it from its habit of darting out of and into the sand, head foremost and instantly, by means of its projecting lower jaw. Its food is principally insects. On the coast of England it is esteemed as food, and is raked out of the sand at low tide in great numbers; it is also caught in seines. Two species are described.—Electrical Eel (*gymnotus electricus*, Linn.). Though apodal and eel-like in general appearance, this fish differs from the eels in the completeness of the jaws, the presence of ribs, and the jointed fin rays; it has neither ventral nor dorsal fin; the anal reaches to the point of the tail, and like the pectorals is enveloped in a thick skin which conceals the rays; the skin is soft and scaleless; the head is oval and flat, the mouth furnished with broad lips, and opening not quite as far as under the eyes; the anterior nostrils are small tubes in a slight depression on the side of the lips, the posterior are behind and above them; lateral line distinct; about 50 pointed teeth on the upper jaw, and 60 on the lower, a second row of about 6 behind the middle of the upper ones, and 4 small teeth in 2 rows along the symphysis; the vent opens before the branchial orifices, and behind it is a small opening and a slender papilla. The only species known inhabits the rivers of the northern parts of South America; it attains a length of 5 or 6 feet, and is of a brown and yellowish color. The elec-

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tric apparatus which has rendered this fish so celebrated occupies the space between the pectorals and the tail, for a large part of the lower bulk of the body; the organs are 4 in number, 2 on each side, the upper and larger organ being separated from the lower by a thin stratum of muscle and membrane, and the organs of one side are distinct from those of the other; the apparatus consists of an assemblage of membranous horizontal plates, nearly parallel and intersected by delicate vertical plates; the cells thus formed are filled with a glutinous matter; the septa, according to Hunter, are about $\frac{1}{10}$ of an inch from each other, and one inch in length contains 240 cells, giving a very great surface to the electric organs. The system is abundantly supplied with nerves from the 200 pairs of ventral spinal nerves, but not from the lateral continuation of the trigeminus and vagus nerves from which the electric system of the torpedo is supplied. The electric eel seems to be a mere appendage to the anterior part of its battery for purposes of moving it about, as all the other organs are confined to a very small space, even the vent opening under the head; and the nerves supplying the electric organs are much larger than those sent to any sensory or motor organs. According to Humboldt, the South American Indians capture these eels by driving horses and mules into the water inhabited by them; the electric powers of the fish being exhausted on the quadrupeds, the former are harpooned and thrown on shore; the horses suffer greatly, many of them being killed by the electric discharges of the fish which glide beneath their bodies. By grasping the head of the eel with one hand and the tail with the other, the most painful and almost insupportable shocks were received, in the experiments of Faraday. This fish is neither voracious nor fierce, but uses its battery to secure its prey, and to defend itself from its numerous enemies. (See ELECTRIC FISHES.)

EELEE, ELE, or ILI, also GOOLDJA, GOULDJA, or GULDSCHA (Chinese, *Hoei-yuan-tching*), a city of S. W. Soongaria, China, and capital of a district of its own name; pop. 75,000. It is a place of banishment for Chinese criminals, but has also considerable trade with the cities of the province of Kansoo, and with other parts of the empire. It is well fortified, surrounded by walls of stone, and contains barracks for the troops, granaries, and government offices. It is situated on the right bank of the river Eelee, a stream over 300 m. long, which rises in the mountains of Thian-shan-nan-loo, and empties into Lake Tengheez or Balkash, near the borders of Siberia.

EELS, ELEEYATS, or ILIYATS, a name applied to the wandering tribes of Persia. They are found in every part of the country, and although many of them have become inhabitants of cities and villages, the majority preserve their ancient customs, living in tents and disclaiming all connection with the old Persian stock. In winter they keep to the plains, but on the approach of summer ascend to the mountains, where they find abundant pasturage for the flocks and herds which constitute their only wealth. They breed camels, horses, and sheep. The latter furnish them with milk, which is made into liquid butter and sold to the inhabitants of the lower country. They pay tribute to the government, and are obliged to furnish a certain number of soldiers and horsemen for the Persian army. In personal appearance the Eeleeyats are frequently prepossessing. The men are hardy, powerful, and well proportioned, with dark brown skins, aquiline noses, and piercing black eyes. The women when young are often beautiful, having delicate nut-brown complexions, regular features, handsome teeth, and countenances beaming with good humor. But perhaps no women in the world change so completely as they advance in years. With the approach of old age the charms of the Eeleeyat females vanish; their skins parch and wither, and their pleasing expression gives place to one of inconceivable repulsiveness. The Eeleeyats usually dwell in communities of 20 or 30 families. Lady Sheil, in her "Glimpses of Life and Manners in Persia" (London, 1856), remarks that "the tent-dwelling Eel is to be recognized by his bold and manly air and his free and independent look. The stationary Eels are termed either Tats or Takhteh Kapoo; the latter term implies that their doors are made of wood, that is, they live in houses. They are also termed Debnisheen, which means village dwellers."

EESSAH, SOMAULEE, or SOMAULI, a powerful tribe inhabiting the territory of Adel, on the coast of the sea of Babelmandeb, E. Africa. They are a pastoral people, leading a roving life, and subsisting chiefly on the produce of their flocks and herds. They have no fixed habitations, and wear little other clothing than a leather apron. They carry shields, spears, bows, and poisoned arrows. The Danakils, a neighboring tribe, hold them in great dread, and describe them as a nation of thieves and murderers, but the character given them by European travellers is more favorable.

EFFEN, JUSTUS VAN, a Dutch scholar, born in Utrecht in 1684, died in Bois-le-Duc, Sept. 18, 1735. He was a graduate of the university of Leyden, and for many years was a private teacher, conducting at the same time several literary periodicals. His first publication of this kind was called *Le misanthrope*, written in French and published at the Hague, shortly after the appearance of Addison's "Spectator." This was succeeded by the *Hollandsche Spectator* (1731–'35). He spent some time in England as secretary of the Dutch embassy, and translated "Robinson Crusoe," Swift's "Tale of a Tub," and 146 numbers of the "Guardian," into French. So thoroughly was he master of that tongue, that some of his writings which appeared anonymously were at first attributed to Fontenelle. A collection of his French works appeared at Amsterdam in 1742, in 5 vols A 2d edition of his *Hollandsche Spectator* was published in the same city in 1756.

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EFFENDI (Romaic, *αφεντης*, lord), in Turkey, the title given to civil officers, learned men, and all those who fulfil any important function.

EFFERVESCENCE, the action which takes place, resembling boiling, when a gas is copiously evolved in the breaking up of one chemical compound and the formation of another, as when the acid and alkaline powders of effervescing draughts are dissolved or mixed, or when an acid is dropped upon carbonate of lime. In both instances carbonic acid gas escapes, as it is said, with effervescence.

EFFERVESCING POWDERS, preparations of acid and alkaline powders, put up in differently colored papers in order to distinguish them, to be used as a medicine by mixing the contents of two different papers after these have been dissolved, and drinking while the chemical reaction is taking place with effervescence. The common soda and Seidlitz powders form effervescing draughts, the acid in one of the papers combining with the alkali of the carbonate in the other, and expelling the carbonic acid. This gas, continuing to be evolved in the stomach, acts as a refrigerant and diaphoretic, while the alkaline salt is slightly laxative. The drink is especially adapted to febrile complaints from its cooling and refreshing qualities. The common soda powders consist of 25 grains of tartaric acid in one paper, and 30 grains of bicarbonate of soda in the other. An equivalent proportion of bicarbonate of potash is sometimes substituted for the soda. The following are the proportions given in the "American Dispensatory": tartaric acid 1 oz., bicarbonate of soda 1 oz. and 54 grains, or bicarbonate of potassa 1 oz. and 160 grains. The acid and either bicarbonate, being separately reduced to fine powder, are divided each into 16 portions. Citric acid is sometimes employed instead of the tartaric acid, in the proportion of 9 drachms to 11 of the soda salt, or 13 of the potash. Seidlitz powders are a mixture of 2 drachms of Rochelle salts (tartrate of potash and soda) and 2 scruples of bicarbonate of soda in one paper, and 35 grains of tartaric acid in the other. The tartaric acid being in excess renders the medicine more pleasant to take, without interfering with its aperient quality.

EFFIGY, HANGING IN, a mode of execution recognized in the ancient legislation of France, in the case of a criminal condemned to death, but who had escaped from custody. In default of the person, a likeness of the convict was conveyed to prison after judgment had been pronounced; whence, at the appointed time, it was taken by the executioner, and conveyed with all the usual solemn and ignominious ceremonies to the public scaffold, and there fastened by the neck to the gallows. Thus, in the reign of Louis the Fat, in the 12th century, Thomas de Marle was hanged in effigy for high treason; and under Louis XIV., in 1662, Alexandre de Noirmoutiers was punished in the same manner for the part which he took in a famous duel. The legislation of the first French republic modified this old custom, suppressing the imitation of an execution, and reducing the ceremony to merely posting the name of the condemned person, together with the judgment against him, upon a public place. The execution by effigy has existed down to the latest date in many other countries, being exercised both by governments and, without legal sanction, by the people. In England it is a popular method of venting spite against unpopular men. Thus in London it was long a custom to hang Guy Fawkes in effigy annually, and frequently the most prominent men of England incur this penalty for some political or ecclesiastical offence.

EFFINGHAM. I. An E. co. of Ga., bounded W. by the Ogeechee river, and separated from South Carolina on the E. by the Savannah; area, 480 sq. m.; pop. in 1852, 3,671, of whom 1,675 were slaves. It has a generally level surface, with a sandy unproductive soil, but there are extensive pine and cypress woods, and lumber is an important article of export. In 1850 the productions were 87,794 bushels of Indian corn, 37,252 of sweet potatoes, and 257,901 lbs. of rice. There were 21 churches, and 208 pupils attending public schools. The county was named in honor of Lord Effingham, a British officer who resigned his commission rather than take arms against the American colonies. Capital, Springfield. Value of real estate in 1856, $526,703. II. A central co. of Ill., drained by Little Wabash river, an excellent mill stream; area, about 500 sq. m.; pop. in 1855, 6,226. It has a level surface, occupied by woodlands and fertile prairies in almost equal proportions. Copper, lead, and iron are found here, and the chief agricultural productions are grain and wool. In 1850 the county yielded 227,025 bushels of Indian corn, 5,169 of wheat, 36,028 of oats, 7,105 lbs. of wool, 41,671 of butter, and 341 tons of hay. There were 5 churches, and 526 pupils attending public schools. Capital, Ewington.

EFFLORESCENCE (Lat. *effloresco*, to flower), the crumbling to powder of some saline bodies as they part with the water that enters into their composition. This is observed in sulphate of soda or Glauber's salts, and in the carbonate also, and is the opposite of deliquescence, in which moisture is abstracted by the salt from the air. The term is also applied to the shooting out of minute spicular crystals, called sometimes a saline vegetation, such as those of saltpetre seen upon the walls of cellars.

EFT, a name given to several species of newts, especially to the common smooth newt (*lissotriton punctatus*, Daud.). The generic characters of the tritons, or aquatic salamanders, will be given under NEWT, which the eft resembles in the slightly free tongue, double longitudinal series of palatal teeth, and nailless toes, 4 before and 5 behind; the skin, however, is smooth, and the dorsal and caudal crests are continuous; there are 2 patches of glandular pores on the head, and none on the back or sides. The newts belong to the genus *molge* of Merrem, and *triton* of Laurenti. Bell separated

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the efts in the genus *lissotriton*. The color in the male is brownish gray above, passing into yellowish beneath, which in the spring becomes bright orange; there are numerous round dark spots of unequal size, and 2 longitudinal streaks on the head; the crest in spring is often tipped with red or violet. The female is light yellowish brown, or buff with brown dots, plainer below. The total length is about 3¼ inches, of which the tail is nearly one half. It is very common in the ditches and ponds of Europe, especially where the water is clear; its food consists principally of aquatic insects, larvæ, worms, and molluska. The reproduction and metamorphosis are almost identical with those of the newts. Though usually spending most of their time in the water, the young in June, and the adults in summer and autumn, become terrestrial; they appear to attain their full size the first year. The experiments of Spallanzani show that the members and the tail may be reproduced several times in succession, with bones, muscles, vessels, and nerves. Like the other amphibia, it is very tenacious of life, and can resist even congelation. Its bite is perfectly harmless. They are eaten by the larger amphibia, by fishes, and by various reptiles, birds, and small carnivora.

ÉGALITÉ, Philippe. See Orleans.

EGBERT, king of Wessex, and 1st king of the united Anglo-Saxons, born about 775, ascended the throne of Wessex in 800, died in 866. The defeated rival of King Brihtric, he took refuge first at the court of Offa, the king of Mercia, and afterward in France, where he was received at the court of Charlemagne, in whose armies he served 3 years. Upon the death of Brihtric in 800 he was recalled to his native country, and acknowledged as king by the West Saxon thanes. In 809 he commenced his career of conquest; and, successively subduing the Britons of Cornwall and the Saxons of Mercia, Kent, Essex, and Northumbria, and assuming at its request the protectorship of East Anglia, by 827 he had become the actual sovereign of the whole heptarchy. In 832 the Danes landed upon the isle of Sheppy, and carried off a rich booty. In 833 they disembarked at Charmouth, and defeated Egbert's forces. They landed again in 835 on the coast of Cornwall, where they formed an alliance with the Britons. Egbert encountered their united forces at Hengstone hill, gained a bloody but decisive victory, punished the rebels, and drove the invaders to their ships. This was his last exploit.

EGEDE, Hans, the apostle of Greenland, born in Norway, Jan. 31, 1686, died in Nov. 1758. After having been several years a pastor in the vicinity of Drontheim, he resigned his functions in 1717, intending to embark for Greenland as a missionary. He was unable to obtain a royal audience before the spring of 1719, owing to the wars with Charles XII. of Sweden, which engrossed the public attention. He then received the patronage of Frederic IV. of Denmark, and set sail in May, 1721, with 2 vessels, his wife, 2 sons, and 46 other persons, and in July following landed upon the coast of Greenland in lat. 64° N. His mildness and zeal gained the affections of the rude natives, and after several years of effort he was able to preach the gospel in their language. Various calamities, among which were the ravages of the small pox, almost annihilated the result of his labors. Yet before his departure he succeeded in laying a foundation for the further propagation of Christianity upon those icy shores, and in establishing the germs of what was to be an important commerce. The Danish government sent out 3 Moravian brethren to aid him, and after a residence of 15 years in Greenland, Egede, seeing the colony flourishing in the hands of the Moravians, asked and obtained permission to leave it. He continued his labors for the evangelization of Greenland, after his return to Denmark, by publishing several works, and by superintending a seminary designed especially for the education of missionaries for that country.—Paul, son of the preceding, and successor in his apostolical labors, born at Waagen, near Drontheim, in 1708, died June 3, 1789. He was a child when he went with his father to Greenland, and in 1728 returned, bringing to Copenhagen several Esquimaux, with the design of initiating them into European civilization. They all died, however, of the small pox. After pursuing his theological studies in Denmark, he returned to the mission station, and labored there 4 years after the return of his father. He translated the "Imitation of Christ" and portions of the Bible into the language of Greenland, and at his departure left the colony in a highly prosperous condition. He fulfilled various functions in Denmark, was particularly active in expediting the exploring mission of Lövenön to the coasts of Greenland, and at the time of his death occupied a chair of theology.

EGER (Boh. *Cheb*), a frontier city of Bohemia, on a river of the same name, at the foot of the Fichtelgebirge, 92 m. W. from Prague; pop. 10,500. It has cotton and woollen manufactories, and in its vicinity at Franzensbad are chalybeate springs and baths. Its fortifications, formerly strong, were destroyed in 1808. It has a city hall, in which Wallenstein was assassinated, Feb. 25, 1634, and the ruins of a castle in which the friends of Wallenstein were killed. Eger was taken and retaken by both Swedes and imperialists during the 30 years' war. In the Silesian war it was taken by the French under Marshal Saxe in 1742, and again under the marshal de Belleisle in 1745. Prior to 1850 this city was the capital of a district of the same name, whose inhabitants, 30,000 in number, differed in manners, customs, and costume from the neighboring population. Since then, it gives its name to a circle containing 560,000 inhabitants, in which the former district of Eger is comprised.

EGERIA, one of the *Camenæ* or nymphs of Roman mythology, who was believed to have dictated to Numa Pompilius his wise laws, and

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to have instructed him respecting the forms of worship which he introduced. It was said that she even became his wife, and that being inconsolable after his death, she was changed into a fountain. She had been worshipped as a rural and prophetic divinity from the earliest periods of Latium, and was invoked as the giver of life by pregnant women. Numa consecrated to her a grove in the environs of Rome, and to strangers visiting that city even now there is pointed out the grotto and fountain of Egeria in the beautiful valley of Caffarella. Upon ancient sculptures this nymph is represented in a costume similar to that of the muses and sibyls, with floating robe, naked feet, dishevelled hair, and in the attitude of writing in a volume which she holds upon her knees.

EGERTON, Francis. See Bridgewater.

EGERTON, Thomas, baron of Ellesmere and viscount Brackley, lord chancellor of England, born in Doddleston, Cheshire, in 1540, died in London, March 15, 1617. He was educated at Brazenose college, Oxford, and having been called to the bar, by his learning and integrity soon attracted the attention of Queen Elizabeth. He was appointed successively solicitor-general, attorney-general, on which occasion he was knighted, master of the rolls, and in 1596 lord keeper, the queen herself delivering the great seal to him at Greenwich. James I., upon his accession, in recognition of Sir Thomas Egerton's great services, "not only in the administration of justice, but also in council," created him Baron Ellesmere, and appointed him lord high chancellor. He was subsequently elected chancellor of the university of Oxford. In March, 1617, he resigned the great seal, having retained it, as lord keeper and chancellor, for a longer period uninterruptedly than any of his predecessors or successors. Beside his judicial duties, he was frequently employed by Elizabeth and James in the negotiation of treaties, and in other important state affairs. In person, in character, and in the variety and profoundness of his learning, Lord Ellesmere seems to have been equally admirable. His integrity passed into a proverb, and according to Fuller, many persons went to Westminster hall only "to see his venerable gait, and were highly pleased at so acceptable a spectacle."

EGG. Birds and most insects and fishes, and some other animals, are generated from globular-formed bodies called eggs, produced within the mother. These, after being deposited by the parent in favorable situations, and exposed to the proper influences of temperature, &c., undergo a succession of changes, which at last result in a fully developed living creature. (See Embryology.) This, breaking through the outer crust that has confined it, enters upon its new existence. The eggs of the lower orders of animals are collected and held together in great numbers by a viscous membrane, and are called spawn. Those of birds are deposited singly. They consist of a calcareous shell, white or colored, formed almost wholly of carbonate of lime; the other constituents are minute quantities of animal matter, phosphate of lime, carbonate of magnesia, oxide of iron, and sulphur. Lining this hollow shell is a thin and tough membrane, composed principally of albumen. At the larger end of the egg is a space between the outer shell and this membrane, which, very small when the egg is first laid, gradually increases with its age. It is called the *vesicula aëris*, and is filled with air, in which the proportion of oxygen is larger than in the atmosphere. This, it is said, is for the respiration of the unhatched chick. Within the membrane is the white of the egg, or the albumen, a viscid liquid, in membranous cells, which encloses the yolk and the real germ of the animal. As this germ left the place of its production in the body of the female, and passed into the egg-discharging canal, the albumen gathered around it in successive layers, a portion in very delicate membranes, called the *chalazæ*, which are attached to the poles of the yolk, and serve to suspend it in such a manner that the smaller and lighter half must always be uppermost. The outer layer of the albumen is less thick and viscid than that next the yolk. Around it the lining membrane and calcareous shell are successively added before the egg is laid. The composition of the albumen is: water, 85 parts; pure albumen, 12; mucus, 2.7; and saline matter, 0.3, including soda with traces of sulphur; or, according to Dr. Thomson, water, 80; albumen, 15.5; mucus, 4.5; ash, 0.475. The yolk, called *vitellus ovi*, is also a glairy fluid, commonly of a yellow color, enclosed in its own membrane, and consists of a great variety of constituents, viz.: water, 41.486; a form of albumen called vitelline, 15.76; margarine and oleine, 21.304; cholesterine, 0.438; oleic and margaric acids, 7.226; phosphoglyceric acid, 1.2; muriate of ammonia, 0.034; chlorides of sodium and potassium and sulphate of potassa, 0.277; phosphates of lime and magnesia, 1.022; animal extracts, 0.4; and 0.553 of coloring matter, traces of iron, lactic acid, &c. Upon one side of the yolk is a round spot, yellowish white, called the *cicatricula*, the germ of the ovum, which by the arrangement of the chalazæ, already referred to, is always kept uppermost, and next to the source of heat supplied by the animal in sitting. As this is developed into the fœtus, the albumen first furnishes nourishment to it, and when this is consumed more is supplied by the yolk. Eggs of the hen are hatched by being kept at a temperature of 104° for 3 weeks. Their vitality has been retained after they have been exposed to a temperature of 10° F.; and it is a remarkable fact that the freezing point of new-laid eggs is much lower than that of the water and albumen of which they principally consist, and both of which congeal at about the same temperature. Eggs, too, that have been once frozen, or have been long kept, freeze at the point their constituents would seem to require. The specific gravity of new-laid eggs is from 1.08 to 1.09. By keeping they diminish in weight from evaporation of water, and the substitution of air

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through the pores of the shell. This diminution has been observed to continue for 2 years; an egg weighing originally 907½ grains being reduced, as remarked by Dr. Thomson, to 363.2 grains. When they have lost so much weight as to float upon water, they are generally unsound. The preventing of this evaporation by covering their surface with a coating of varnish, wax, gum arabic, or lard, checks their putrefaction. It is said that if every new-laid egg was at once rubbed over with sweet butter, it would be a rare thing to see one unsound. The Scotch sometimes drop them in boiling water for 2 minutes, by which the membrane within the shell is partially coagulated and rendered impervious to air. Hens' eggs vary so much in gravity, that it is a wonder they continue to be sold by numbers instead of weight. A dozen of the largest have been found to weigh 24 oz., while the same number of smaller ones of the same stock weighed only 14½ oz. The fair average weight is said to be about 22½ oz. to the dozen. The relative weights of the portions of the egg as given by Dr. Thomson are: shell and membrane, 106.9; albumen, 604.2; yolk, 288.9. About ¼ of the entire weight may be regarded as nitrogenous and nutritious matter, a greater proportion than that of meat, which is rated at only from 25 to 28 per cent., while the nutritive portion of the oyster is only about 12 per cent. The white of the egg, from its tendency to coagulate into a hard and indigestible substance, is likely to disagree with the stomach of invalids, when the yolk may prove perfectly harmless. Raw eggs are more wholesome than boiled, or even than those lightly poached, which are very digestible. Eggs become more difficult of digestion by being kept. In medicine the shell is used as an antacid, its animal composition seeming to adapt it better for the stomach than chalk, the mineral form of carbonate of lime. The white is employed for clarifying liquors and sirups, which it accomplishes by entangling the small particles floating in them as it coagulates, and either rising with them to the surface, or sinking to the bottom. An astringent poultice is formed by causing it to coagulate with a piece of alum briskly stirred with it. This, under the name of alum curd, is used as an application to the eye in some forms of ophthalmia. The white is also used as an antidote to corrosive sublimate and salts of copper. The yolk is sometimes given in jaundice, and forms an excellent diet in dyspepsia. It is preferable to the white in making emulsions. The largest sized eggs of which we have any account are some found in 1850 in alluvium in Madagascar. They belong to a bird which it is supposed has recently become extinct, to which M. Saint Hilaire has given the name of *æpiornis maximus*. Two of the eggs are preserved in the French academy. One of them measures 13½ inches on its longest diameter, and 8½ inches on the shortest. The thickness of the shell is about ⅛ of an inch. The capacity of the egg is about 8½ quarts, 6 times that of the ostrich's egg—equal to 148 hens' eggs, or 50,000 eggs of the humming bird. From some of the bones of the bird which have been preserved, its height is calculated to be about 12 feet.—EGG TRADE. The demand for eggs as an article of diet has given rise to an immense trade in furnishing the supplies required by large cities and thickly populated districts; and by means of railroads and steamboats they can be transported long distances with despatch and safety. From the western states and from the British provinces they are brought in barrels to the seaboard of the United States, those from the provinces being admitted free of duty. In a single day as many as 15,120 have been entered at Boston from Nova Scotia; and in 1852 about 8,000 barrels, containing 84 dozen each, amounting to about 8,000,000 eggs, were shipped from Montreal to the United States; but this amount is probably small compared with the quantities brought from Ohio and the other interior states. In Great Britain the home production is put down at 75,000 tons annually, and the value at $15,000,000. Beside this, the importations comprised 117,230,600 eggs in 1856, and 126,818,600 in 1857. The imports from France into England amounted in the former year to £244,041; from Belgium, £19,677; from Spain, £11,830; from the channel islands, £1,731; from other parts, £1,143; total, £278,422. Since 1854 the duty on foreign eggs is 8*d.* per cubic foot of 200 eggs, and only 4*d.* on those from British possessions. They are packed in crates and boxes, the contents of a single box amounting to 2,500 to 13,000 eggs. The consumption in Paris is also enormous. In 1835 it was estimated by Legrand at 138 per annum for each individual, and in the provinces at double this rate. By the estimate of M. A. Husson in his late work on the *Consommation* of Paris, the number is now about 175 for each person annually, costing about $1 35, and the whole population thus supplied is rated at 1,000,000. The following table is given of consumption and prices:

Year.	Number.	Av. price per 1,000.
1847	120,940,724	57.00 francs
1848	106,747,229	48.40 "
1849	113,557,789	46.70 "
1850	124,597,150	48.98 "
1851	129,782,299	42.69 "
1852	160,000,000	41.35 "
1858	175,000,000	....

EGG, AUGUSTUS, an English painter, born in London in 1816. He became a contributor to the academy exhibition in 1838, and was elected associate of that institution in 1848. He has produced a great number of pictures illustrative of humorous scenes from Shakespeare, Le Sage, and Walter Scott. In 1857 he was one of the artists connected with the arrangement of the gallery of modern paintings at the Manchester exhibition.

EGG PLANT (*solanum melongena*, Willd.), the popular name of a species of the *solanaceæ*, native of N. Africa. The plant grows to the height of about 2 feet, with a prickly stem, and

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with large ovate, downy, prickly leaves; flowers of a violet color, of some beauty; fruit, a globose berry, crowding itself out from the downy calyx, which remains until the fruit ripens, and the deep purple color it assumes indicates its perfection. Its size, however, depends considerably upon the richness of the soil and warmth of climate, and in propitious seasons it reaches several pounds' weight. In India and other hot countries it is a favorite article of food, and is much used in the United States. It is generally served up in India with sugar and wine, and is used by the French and Italians in stews and soups. Another smaller species is *S. ovigerum*, having a white fruit of the size and appearance of a fowl's egg, chiefly cultivated as an ornamental curiosity, and sometimes reared in pots to secure the ripening, as a long season seems requisite at the north. The seeds of the egg plant should be sown on a slight hot-bed in March or early in April, and the plants should be transplanted in the latter part of May, or in June, in rich, warm ground, at the distance of 2½ feet asunder every way. Weeds should be carefully eradicated from among them, the soil frequently loosened with the hoe, and drawn up around the stems. Among the Chinese, *S. Æthiopicum*, having similar fruit, is esteemed for furnishing an ornamental dish on great occasions and on festal days.

EGINHARD, or EINHARD, the secretary, confidential adviser, and biographer of Charlemagne, born in Austrasia (East France), died July 25, 844. He was a pupil of Alcuin, who introduced him at court. He retired, after his royal patron's death, to a country residence near Mühlheim, in the Odenwald, where he devoted himself to literary pursuits. After the death of his wife, who is believed to have been a daughter of Charlemagne, he built a convent at Seligenstadt, in the present grand duchy of Hesse, and entered it as a monk. The sarcophagus in which he and his wife were buried is still shown at the castle of Erbach, and the counts of Erbach claim to be his lineal descendants. The *Vita Caroli Magni*, by Eginhard, is one of the best biographical works of the middle ages. It has been republished by Ideler (Hamburg, 1839), and also in the second volume of Pertz's *Monumenta Germaniæ Historica*. Eginhard's *Annales Regum Francorum*, and a collection of his letters, are likewise of great value to the historian. The popular version of Eginhard's courtship with Charlemagne's daughter has frequently been the subject of poetical and dramatic representation.

EGLANTINE, an old English name for the sweet brier (*rosa rubiginosa*, Linn.), a well-known and delightfully fragrant-leaved rose, growing plentifully in rich pastures and neglected fields. In deep soils and under favorable circumstances it is not uncommon for the old well-established roots to send up vigorous shoots or suckers 8 or 10 feet high, which are covered with harsh, crooked prickles. The flowers, which are for the most part borne upon the lower branches, are of a beautiful light rosy color, and full of fragrance. The chief perfume of the plant, however, is in the foliage, its leaves being beset with russet-colored glands, which, on being slightly bruised, emit a peculiar scent. The eglantine succeeds well in the garden, if ample room and a deep soil are allowed it, and in such cases it has been known to produce occasionally double flowers. It grows readily from the seeds, and sown in rows the plants have been clipped into shape to form low and ornamental hedge divisions. The species best known in the United States is supposed to be an adventitious one from Europe, and was introduced with a co-species, also fragrant (*R. micrantha*, Smith), having smaller flowers and a different shaped fruit or seed vessel. Both seem to have scarcely extended beyond the sea-coast of New England.

EGLINTON AND WINTON, ARCHIBALD WILLIAM MONTGOMERIE, earl of, born in Palermo, Sept. 29, 1812. He is lord lieutenant of Ayrshire, has held on various occasions other local appointments, and was elected in Nov. 1852, lord rector of Glasgow university. From Feb. to Dec. 1852, he was lord lieutenant of Ireland, and to this office he was again appointed, Feb. 25, 1858. He is principally known as a patron of the turf and as an amateur of tournaments. He gave in 1839 a splendid entertainment of the latter kind at Eglinton castle. The duchess of Somerset, then Lady Seymour, was the queen of beauty on that occasion, and Louis Napoleon took a part in the pageant. His first wife died in 1853, and he married, Nov. 3, 1858, Lady Adela Capel, only daughter of the earl of Essex.

EGMONT, LAMORAL, count of, a soldier and statesman of the Netherlands, born in the castle of La Hamaide, in Hainaut, in 1522, executed in Brussels, June 5, 1568. From his mother, the most beautiful Flemish woman of her time, he inherited the dignity of prince of Gavre, but he preferred the more modest title of count of Egmont, which came to him from his father, and which bespoke a lineage as lofty as many sovereigns could boast. Through a line of chivalrous and distinguished ancestors he traced his descent from ancient pagan Frisian kings. By the death of an elder brother he became sole male heir to the titles and estates of a family which was second to none in Flanders in antiquity, wealth, and power. He was in his boyhood a page of the emperor Charles V., and in his 19th year commanded with distinction a troop of light horse in the expedition against Algiers. Returning to his country by way of Corsica, Genoa, and Lorraine, in 1545 he married Sabina of Bavaria, sister of the elector palatine, the emperor and a concourse of the electors and principal nobles of the empire honoring the nuptials by their presence. He was in the following year invested with the order of the golden fleece; in 1553 he attended the emperor during the siege of Metz; in 1554 he was

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at the head of the splendid embassy sent to England to solicit for Philip II. of Spain the hand of Mary Tudor; and in 1555 he was a prominent figure in the throng amid which Charles V. transferred to Philip his dominions in the Netherlands. In 1557, when war broke out between Spain and France, he was esteemed one of the 5 principal generals in the Spanish service, and commanded the cavalry in the army which invaded France and invested St. Quentin. The constable Montmorency advanced with a select body of troops to relieve the garrison, but failed to accomplish his purpose. Egmont, at a council of war held in his tent, proposed to cut off the retreat of the French. His eloquence gained the assent of the council to this project, and having detected a feebly guarded defile in the rear of Montmorency, he threw into it a portion of his cavalry before the constable was able to strengthen it; and the main French army on its approach to the post found itself confronted here by Egmont, who assailed it with a brilliant charge at the head of 2,000 horsemen. The French received a total and most disastrous defeat. Of 21,000 troops, all but 6,000 were killed or captured within an hour; more than 80 standards fell into the hands of the victors; and 600 prisoners of noble birth were on the following day presented to Philip in the camp before St. Quentin. Rarely had a Spanish monarch enjoyed so signal a triumph as that which was thus achieved by the promptness and gallantry of Egmont. In the following year the marshal de Thermes, who had taken a distinguished part in the capture of Calais, marched into West Flanders, storming and pillaging Dunkirk and devastating the country as far as Nieuwpoort. Flushed with victory and laden with spoils, his army was already on its homeward march, when Egmont took the field to intercept its retreat. With such forces as he could collect in the neighborhood, amounting to 10,000 foot and 2,000 horse, whose numbers were increased by large volunteer bands of the peasantry, he threw himself into the path of the French army, and arrested its progress near Gravelines. In the hard-fought action which followed, Egmont displayed brilliant valor, and the army of De Thermes was annihilated, and himself taken prisoner. In respect to its results, the battle of Gravelines was one of the most decisive in history, for it compelled the French monarch to consent to a treaty which has been pronounced more ruinous than any other in the annals of France. These two splendid victories gave Egmont great renown and popularity, and largely augmented his hereditary influence in the Netherlands. Rather from a generous sensibility to the wrongs of his countrymen than from any settled principle, he ranked himself among the malcontents against the oppression of Philip, in opposition to which he was from the first closely associated with William of Orange. But his conduct as a statesman was as weak and vacillating as it had been prompt and audacious in the field; and, swayed by the contrary motives of sympathy with the popular movement, loyalty to the throne, and devotion to the Roman Catholic church, he accomplished by alternate hesitation and rashness only his own ruin. In 1559 Egmont and the prince of Orange were appointed members of the state council of the Netherlands under the regent Margaret of Parma; but being excluded from consultation on the most important affairs of state, they addressed (July 23, 1561) a joint letter of remonstrance to Philip. Egmont united with Orange and Horn (March 11, 1563) in another letter to the king, urgently remonstrating against the extent of the authority of Cardinal Granvelle, a leading member of the council, who was declared to be odious to many of the people. The unpopularity of Granvelle increased daily, and the most reckless and resolute of his opponents was Egmont, who despised him for his low birth, and hated him for his airs of superiority. At a banquet given to a party of Flemish noblemen it was decided to invent for their menials a livery that should symbolically express the general contempt for the cardinal. Dice were thrown to decide who should devise the typical costume; and the prize, which ultimately proved a deadly one, fell to Egmont. His retainers appeared in a few days in the famous fool's cap livery, which immediately became the reigning fashion, and which, together with the numerous pasquinades and pamphlets, drove Granvelle from the Netherlands. Thus far Egmont had acted under the eye and influence of William of Orange. In 1565 he was sent as special envoy to Spain to enlighten the Spanish court concerning the affairs of the Netherlands; but he became the dupe of royal smiles and favors, and returned to his country only to discover that his mission had been fruitless. For a year his course was uncertain and fitful, after which he departed for his government of Flanders, then in rebellion against the royal edicts. Had Egmont now put himself at the head of the reformers, he might undoubtedly have seized the capital, imprisoned the regent, and made himself master of the country; but on the contrary, he exerted himself with all his energy and with extreme severity against the insurgents and Protestants. He continued enthusiastic in his loyalty, offering to throw himself into Walcheren against the rebels who had taken refuge there, risking his life at Valenciennes to reconnoitre the works and suggest the best point of assault, and avowing his intention at a meeting with Orange at Willebroek never in any case whatever to take arms against the king. On the arrival of Alva in the Netherlands in 1567 Orange escaped from the country, but Egmont remained to receive and do honor to the man who came armed with his death warrant. Alva arrested him by stratagem together with Count Horn at Brussels, and conveyed them under a strong military escort to Ghent, where for 2 months they were kept in rigorous confinement. In vain Egmont claimed to be tried by one of

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the 3 courts whose jurisdiction alone he recognized. As a knight of the golden fleece it was his privilege to be tried by its statutes; as a noble of Brabant he claimed the protection of the *Joyeuse Entrée;* and as a count of the holy Roman empire, he should be tried by his peers, the electors and princes of the realm. He was brought before the tribunal known in history as the "council of blood," was charged with having been a party to the league and conspiracy of the prince of Orange and his associates, and with having committed sundry malpractices to the prejudice of the government and of the Catholic church, and after little more than a mock trial was adjudged guilty of treason and rebellion. His later zeal in the service of the government had not atoned in the minds of Philip and Alva for his earlier acts of opposition. Meantime the prince of Orange had thrown down the gauntlet, as the avowed champion of his country's wrongs, and it was designed to strike terror to the heart of the people by making the execution of Egmont and Horn an impressive and appalling spectacle. On June 5, 1568, 3,000 Spanish troops were drawn up in battle array around the scaffold in the great square of Brussels, and, while all business was suspended and the bells of the churches were tolling, Egmont was beheaded, after having expressed a bitter regret that he had not rather been permitted to die, sword in hand, fighting for his country and king. Even the soldiers shed tears as they beheld the death of the most gallant and famous of their generals; a cry of horror rose from the multitude; and the French ambassador exclaimed that he had seen the head of that man fall before whom France had twice trembled.—Egmont is the subject of one of Goethe's tragedies. The best account of his career and character is given in Motley's history of the "Rise of the Dutch Republic" (New York, 1856). See also Prescott's "History of Philip II."

EGRET, a name given to those species of white herons which have the feathers of the lower part of the back elongated and their webs disunited, reaching beyond or to the tail, at certain seasons of the year; their forms are also more graceful than those of common herons. They belong, however, to the same genus *ardea* (Linn.), of the order *grallæ*. The great American egret (*A. egretta*, Gmel.) is about 37 inches long to end of tail, 49 to end of claws, with an extent of wings of 55 inches; bill 4½ inches, tail 6½, tarsus 6; anterior toes 2½, 4, and 3½ inches, with the claws ½, ¾, and ⅝ of an inch respectively; the hind toe 1½, and its claw 1½ inches long; weight about 2½ lbs.; the female is somewhat smaller. The bill is straight, tapering to an acute tip; the head compressed and oblong; neck long and slender; body compressed; feet, tarsus, and tibia long, the latter bare in its lower half. The space between bill and eye, and around the latter, is bare; the plumage is soft and blended; head not crested, though its feathers are elongated, as are those on the lower neck in front; from between the shoulders arises a tuft of long, decurved, and delicate disunited feathers, extending about 10 inches beyond the tail; the wings are moderate, and the tail short, of 12 weak feathers; the bill is bright yellow, feet and claws black, and the plumage white, in some parts slightly tinged with yellow. This elegant bird is found breeding from Florida to New York, and along the shores of the gulf of Mexico to Texas, and probably further; it is rarely seen in Massachusetts, and does not appear more than 50 miles inland, unless along the courses of large rivers; it generally breeds in low marshy places, dismal swamps, and the margins of lakes and ponds; the nests are sometimes made on low bushes, and occasionally on sandy islands near the coast, but generally on high trees. The long, silky filaments of the back are hardly to be seen except in the love season, which varies from early spring to midsummer, according to latitude; both sexes possess them, and many are shot during the breeding season to obtain these feathers for ornamental purposes. It feeds by day, on small fishes, crustacea, and reptiles, which it catches in the shallows and marshes; its flight is well sustained, and its gait and movements are graceful. The nest is made of loose sticks, overhanging the water, and is used for years by the same birds, which annually repair it; the eggs, 2 or 3, are 2½ inches long, when freshly laid smooth and pale blue, becoming afterward rough and whitish. The egret is shy and difficult to obtain, except in the breeding season; many of the young are destroyed by crows and turkey buzzards.—The European egret (*A. alba*, Gmel.) is about 3 feet 5 inches long, of a pure white plumage. According to Selby, the bill is black or dark brown, yellow at the base and about the nostrils, and the legs are almost black. It is common in southern Europe, but comparatively rare in the northern and central parts; the white herons of Asia are believed to be of this species. The little European egret (*A. garzetta*, Linn.) is about 22 inches long from bill to end of tail; the plumage is white; from the hind head spring 2 narrow feathers 4 inches long; the plumes of the back are elongated; the bill and tarsi are black; the tarsus is 4 inches long. This species is confined to the eastern hemisphere, being most abundant in southern Europe, Greece, and northern Africa; it occasionally wanders as far as England. The buff-backed egret (*A. Coromanda*, Bodd.) is about 20 inches long, the bill 2 inches and orange yellow; the plumage is white, except the top of the head and front neck, which are buff, becoming browner as the bird grows older; it is very generally distributed over Asia. The reddish egret (*A. rufa*, Bodd.), of which Peale's egret is the young, is about 31 inches long, and 46 in extent of wings; the pale bill has a black tip; the iris is white; the feathers of the head and neck are loose and pendent, of a light reddish brown tinged with lilac, fading into brownish white at the tips; the back and wings grayish blue; long feathers of the back yellowish-tipped;

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pale grayish blue below. It seems never to go far from the Florida keys, except westward along the gulf of Mexico; it is a plump and graceful bird, and an easy and high flier; it is shy, rarely associating with other species; it is probably strictly marine. The nests are made by the middle of April; the eggs are 3, of a pale sea-green color, and are excellent food.

EGYPT (Gr. Αιγυπτος; Lat. *Ægyptus;* Heb. *Mizraim;* Coptic, *Chami* or *Kemi*), a country in the N. E. of Africa, bounded N. by the Mediterranean, E. by the Red sea and Arabia, S. by Nubia, and W. by the Great Desert. It lies between lat. 31° 37′ and 24° 1′ N., and long. 27° 13′ and 34° 12′ E. Its length from N. to S. in a direct line is about 520 m.; its breadth from E. to W. varies from 300 to 400 m.; area, including the desert regions, about 200,000 sq. m. The river Nile enters Egypt from Nubia at the island of Philæ near Asswan, the ancient Syene, where it descends the famous cataracts, and flows thence unbroken by falls or rapids, and not augmented by any branch, nor even by a rivulet, till it reaches the Mediterranean. From the cataracts the river, whose general breadth is about half a mile, runs for 600 m. through a valley bounded by hills varying in height from 300 to 1,200 feet. The average breadth of the valley is 7 or 8 m., its greatest breadth 11 m. Anciently the whole of this valley was called Upper Egypt, but afterward the term Middle Egypt was applied to the northern part of it. About 100 m. from the sea, the hills disappear, and the river enters an extensive and perfectly level alluvial plain, where, 12 m. N. of Cairo, it separates into two great streams, which continually diverge until they reach the Mediterranean by mouths about 80 m. apart, the eastern at Damietta, and the western at Rosetta. This great plain is Lower Egypt. The triangular space enclosed by the two arms of the river and the sea is called the Delta, from its resemblance in shape to the Greek letter Δ. But the term Delta is also sometimes applied to the whole plain, or to so much of it as consists of fertile land. The area of the Delta and of the valley of the Nile in Egypt is variously estimated at from 11,000 to 17,000 sq. m. This comprises all the cultivable land, the rest of the country consisting of deserts, with the exception of a few oases and of the region called Fayoom, which lies at no great distance W. of the Nile, between lat. 29° and 30°, and has a fertile area of 340 sq. m. The largest of the oases, the one most remote from the Nile, is Siwah, the ancient Ammonium, the site of the temple and oracle of Jupiter Ammon. It lies 10 days' journey W. of Fayoom, and has an area of only 15 or 20 sq. m. The desert between the Nile and the Red sea is intersected by chains of mountains whose highest summits attain an elevation of 6,000 feet.—The most noted lake of Egypt is the Birket-el-Karoun, in the N. W. part of Fayoom; it is 30 m. long and 6 m. broad. The remains of the famous ancient artificial lake Mœris have been recently identified in the E. part of Fayoom. To the north of the Birket-el-Karoun, at the distance of 50 m., are the natron lakes, from which the water evaporates in the dry season, leaving the ground covered with a crust of natron or carbonate of soda. Along the sea-coast of the Delta there is a series of large lagoons stretching for nearly 200 m., of which the principal are Lake Maryoot, the ancient Mareotis, 40 m. long, Lake Boorlos, 30 m. long, and Lake Menzaleh, 50 m. long, with an average breadth of 15 m. From a very ancient period Egypt has abounded in canals, chiefly constructed to facilitate the distribution of the water of the Nile for purposes of irrigation. The Mahmoudy canal, 50 m. long and 100 feet broad, was made in 1820 to accommodate the commerce between Alexandria and the Nile. In the beginning of 1859 Egypt had about 500 m. of railroad completed. The principal lines are from Alexandria to Cairo, 131 m.; from Cairo to Suez, 91 m.; and from Cairo to Beni-Souef, up the Nile, 76 m. The railroad bridge across the Nile at Kafr-el-Zyat is one of the greatest works of the kind in the world, and is expected to be completed in June, 1860. Another great work commenced several years ago, but not yet finished, is the *barrage* or dam across the Nile at the beginning of the Delta, designed to heighten and regulate the annual inundation. The construction of a canal across the isthmus of Suez to unite the Red sea with the Mediterranean was begun April 25, 1859.—The most striking geological feature of Egypt is the vast bed of alluvium deposited by the Nile, which covers all Lower Egypt to a depth that probably averages 30 or 40 feet. The predominant rocks of the country are limestone, sandstone, and granite. The great pyramids are built of limestone, and stand on a limestone plateau. This rock extends up the valley of the Nile as far as Esne, and from thence to Asswan or Syene sandstone prevails, from the quarries of which most of the temples of Egypt have been built. At Syene, at the southern extremity of the country, granite predominates, and the quarries there have furnished chiefly the materials for the obelisks and colossal statues of Egypt. The soil of Egypt is of unsurpassed fertility, and its richness is annually renewed by the inundation of the Nile, which deposits upon the land a coating of mud which renders needless any other manure. In many parts ploughing is dispensed with, the seed being thrown upon the mud, and sheep, goats, or pigs turned loose in the fields to trample in the grains; though in other parts agriculture is carried on with considerable labor and care, especially where artificial irrigation must be resorted to. The rise of the Nile begins in Egypt in the latter part of June. The inundation reaches its greatest height between Sept. 20 and 30, when it is usually 24 feet above the low water level. It remains at that height about 15 days, and then gradually falls, till it is at the lowest about the middle of May. It rises sometimes 30 feet, when it does great damage to the country. If it fall short of 18

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feet, a famine is the consequence. The following plants are sown immediately after the inundation begins to subside, and are harvested 3 or 4 months later: wheat, barley, beans, peas, lentils, vetches, lupins, clover, flax, lettuce, hemp, coriander, poppies, tobacco, watermelons, and cucumbers. The following plants are raised in summer chiefly by artificial irrigation: durra, maize, onions, henna, sugar cane, cotton, coffee, indigo, and madder. Grapes are plentiful, and other fruits abound, of which the most common are dates, figs, pomegranates, apricots, peaches, oranges, lemons, citrons, bananas, mulberries, and olives. There are no forests in Egypt, and few trees of any kind except the palm, of which there are usually groves around the villages. From the absence of forests there are few wild beasts, the principal species being the wolf, fox, jackal, hyena, the wild ass, and several kinds of antelope. The chief domestic animals are camels, horses, asses, horned cattle, and sheep. The hippopotamus is no longer found in Egypt, though it is met with in the Nile above the cataracts, and the crocodile has abandoned the lower part of the river, and is becoming rare even in Upper Egypt. Among the birds are 3 species of vultures (one of which is very large, individuals sometimes measuring 15 feet across the wings), eagles, falcons, hawks, buzzards, kites, crows, linnets, larks, sparrows, and the beautiful hoopoe, which is regarded with superstitious reverence. Pigeons and various kinds of poultry are very abundant. The ostrich is found in the deserts. Among the reptiles are the cerastes and naja haje, both deadly poisonous. Fishes abound in the Nile and in the lakes, and furnish a common and favorite article of food. Locusts occasionally invade the country and commit great ravages. The climate of Egypt is singularly dry and equable, and is healthy, though excessively hot in summer, the mercury rising sometimes to 112°. The winter is mild and serene, snow being almost unknown. In Upper Egypt rain is so rare that a slight shower is looked upon as a prodigy. In the Delta a small quantity of rain occasionally falls in winter. The most common diseases are dysentery, liver complaints, and ophthalmia, the latter being often met with. The plague was formerly frequent and virulent, but owing to the sanitary precautions of the government it has not made its appearance since 1843. One of the most disagreeable features of the climate is the khamsin, a hot wind from the desert which prevails for 50 days in the spring, beginning generally about May 2, and has a peculiarly oppressive and unhealthy effect.—Egypt is now divided into 7 provinces, which are subdivided into departments, and these again into lesser districts. Anciently, under its native rulers and their Persian, Greek, and Roman successors, the country was divided into districts called nomes, varying in number at different eras from 36 to 56 or 58. The capital of Egypt is Cairo, and the other principal towns are Alexandria, Rosetta, and Damietta. There is much uncertainty about the amount of population. A government census in 1847 officially stated the number of inhabitants at 4,542,620. A census taken during the present year (1859) gives a total of 5,125,000. By foreign observers of judgment and accuracy, these censuses are discredited and their results held to be grossly falsified and exaggerated. Sir Gardner Wilkinson computes the population at only 1,800,000. By others it is supposed to be about 2,500,000, of whom 2,000,000 are Mohammedans and call themselves Arabs, though they are probably in great part descended from the ancient Egyptians. They are a fine race, handsome, well made, and courteous in their manners. In northern Egypt they are of a yellowish complexion, growing darker toward the south, until the hue becomes a deep bronze. Mr. Lane, the best authority upon the subject, speaks highly of their mental capacity, and gives them credit for uncommon quickness of apprehension and readiness of wit. They are highly religious, and are generally honest, cheerful, humane, and hospitable. The Arabs of pure blood belonging to Egypt are chiefly Bedouins who dwell in tents in the desert, and number about 250,000. There are 150,000 native Christians termed Copts, who are the recognized descendants of the ancient inhabitants. They are generally employed as clerks and accountants in government and mercantile offices. Beside these there are Turks, the ruling class, of whom there are about 20,000, and Armenians, Greeks, Berbers, Jews, and Franks. Agriculture is the chief pursuit of the people, and furnishes all the staples of export. Wheat, beans, barley, Indian corn, linseed, sesame, cotton, wool, flax, and henna are annually exported to the amount of about $16,000,000. Wheat is the principal article of export, and about 5,000,000 bushels, or ⅔ of the entire crop, are sent to Europe annually. Of cotton the average annual export for several years past has been nearly 200,000 bales. The annual amount of imports is about $14,000,000; the principal articles are timber, copper, coal, woollen, cotton and silk goods, drugs, tinware, paper, oil, jewelry, sugar, glass, tobacco, spices, and coffee. The foreign commerce is chiefly with Great Britain, France, and Austria, and is carried on through the port of Alexandria. An extensive trade by means of caravans is maintained with the interior of Africa. The manufacture of firearms, and of cotton, silk, and woollen goods, is carried on extensively in establishments founded and directed by the government.—Egypt is a dependency of the Turkish empire, and is governed despotically by a pasha of the family of Mehemet Ali, with whom the Turkish sultan made a treaty in 1841, by which it was agreed that the government of the province should be confirmed to him, and in succession to the then living members of his family. A tribute of ¼ of the revenue is annually sent to the sultan, to whom also all appointments to posts in the army above the rank of major have to be referred for confirmation.

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The number of the army is limited to 18,000 men, though this regulation has not been strictly observed. There are ministers of foreign and internal affairs, of war, navy, finance, and public instruction. The government maintains about 50 schools of various grades, a school of languages, another of medicine, several military schools, and a printing press. There are 4 principal courts of justice, whose seat is at Cairo: that of the chief of police, which summarily decides petty cases; that of the cadi, or chief judge; that of the mufti, or chief doctor of the law; and that of the pasha's divan. There is also a cadi in each town and village, who dispenses justice, and each province and subdivision of the country has a governor clothed with a certain degree of judicial power. The dominion of the Egyptian pasha has been extended by recent conquests far up the Nile over Nubia, Dongola, Sennaar, Kordofan, and other barbarous regions, to the confines of Abyssinia.

—The history of Egypt divides itself into 6 great periods: 1, the Pharaohs, or native kings; 2, the Persians; 3, the Ptolemies; 4, the Romans; 5, the Arabs; 6, the Turks. The main sources of its history under the Pharaohs are the Scriptures, the Greek writers Herodotus, Diodorus, and Eratosthenes, some fragments of the writings of Manetho, an Egyptian priest in the 3d century B. C., and the hieroglyphic inscriptions on the monuments, that is, on the temples, tombs, and other buildings of ancient date. From works written on rolls of papyrus, found in the tombs, information has also been derived by recent Egyptologists. There is still, however, much uncertainty and controversy as to the true interpretation of the hieroglyphics, and scarcely any two authors agree either with regard to names or dates; though the discrepancies in regard to names are immaterial, while those in the chronology are wide and apparently irreconcilable. The chief living authorities upon the interpretation of the hieroglyphics are, in English, Sir Gardner Wilkinson, and in German, Chevalier Bunsen and Dr. Lepsius. From the Scriptures we learn that the Hebrew patriarch Abraham went into Egypt with his family because of a famine that prevailed in Canaan. He found the country ruled by a Pharaoh, the Egyptian term for king. The date of Abraham's visit, according to the chronology of the Hebrew text of the Bible, was 1920 B. C.; according to the Septuagint, 2551; while Bunsen fixes it at 2876. Nearly two centuries later Joseph, a descendant of Abraham, was sold into Egypt as a slave to the captain of the guards of another Pharaoh, whose prime minister or grand vizier the young Hebrew eventually became. Joseph's father, Jacob, and his family, to the number of 70, accompanied, as Bunsen conjectures, by 1,000 or 2,000 dependents, followed their fortunate kinsman into Egypt, where they settled in a district called the land of Goshen. There they remained until their numbers had multiplied into 2 or 3 millions, when under the lead of Moses they revolted and quitted Egypt to conquer and possess the neighboring land of Canaan. The date of their exodus, according to the commonly received Scripture chronology, was 1491 B. C., after a sojourn in Egypt of 215, or, at most, of 430 years. Bunsen assigns the date to 1320 B. C., and maintains the duration of the sojourn in Egypt to have been 1,434 years. From the exodus, for several centuries, the relations between the Hebrews and the Egyptians appear to have been friendly, until in the 5th year of the reign of Rehoboam, about 980 B. C., Shishak, king of Egypt, conquered and plundered Jerusalem, an event the occurrence of which is attested and confirmed by the monuments. The first of the Greek authorities upon Egypt, Herodotus, visited the country about the middle of the 5th century B. C. His knowledge of its history was derived from conversation with the priests of various cities, with whom he talked by means of interpreters. They told him, he says, that Menes was the first king of Egypt, and was succeeded by 330 monarchs, of whom one, Nitocris, was a queen. None of them were distinguished, and none of them left any monuments worthy of note, except Mœris, the last of the 330, who constructed the artificial lake which bears his name. He was succeeded by Sesostris, who conquered Ethiopia and the greater part of Europe and Asia. His successors were Pheron, Proteus (who was contemporary with the Trojan war), Rhampsinitus, Cheops, Cephren, and Mycerinus. The last 3 kings built the 3 great pyramids. Mycerinus was succeeded by Asychis, and Asychis by Anysis, in whose reign Egypt was conquered by the Ethiopians, who held it for 50 years under King Sabaco. At the expiration of the half century they voluntarily abandoned the country and retired to Ethiopia. The next king of Egypt was Sethos, between whom and the first king Menes, the priests told Herodotus, there had been 341 generations, a period of 11,340 years. Sethos was succeeded by 12 kings, who reigned jointly, and together built the Labyrinth, which Herodotus thought surpassed all the works of the Greeks, and was even more wonderful than the pyramids themselves. After the lapse of some years, Psammetichus, one of the 12 kings, dethroned the others and made himself sole sovereign of Egypt. He was succeeded by Necho, Psammis, and Apries, the last of whom Herodotus calls the most prosperous king that ever ruled over Egypt. But in the 25th year of his reign a rebellion broke out which was headed by Amasis. Apries was defeated and put to death, and Amasis became king. Amasis was succeeded by his son Psammenitus, at the very beginning of whose reign, 525 B. C., Egypt was invaded and conquered by the Persians under Cambyses. Diodorus, the next of our Greek authorities, was in Egypt about 58 B. C. Like Herodotus, he begins the line of Egyptian kings with Menes, who, he says, was succeeded by 52 monarchs, reigning 1,400 years. These were succeeded by Busiris I., and 7 or 8 generations

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later by Busiris II., who built Thebes. Later still reigned Osymandyas, and after 8 more generations Uchoreus, who built Memphis, and who after 15 more generations was succeeded by Myris or Mœris. Diodorus also relates the exploits of the great conqueror Sesostris, whom he calls Sesoosis. He computes the whole number of native sovereigns of Egypt at 470 kings and 5 queens, and the duration of the native monarchy at 4,700 years. Eratosthenes, who died about 196 B. C., was a native of Cyrene, and was made librarian of the Alexandrian library by Ptolemy III. He wrote a work on universal chronology, fragments of which have been preserved by Syncellus and others. His computation of Egyptian chronology, so far as it goes, has been adopted by Bunsen. Manetho was high priest of Sebennytus about 280 B. C. He wrote a history of Egypt for the information of the Greeks, of which only some extracts have reached us in the works of later writers, who do not agree in their transcription of the most important part of these remains, which is a list of the dynasties and sovereigns of Egypt from the earliest period to the end of the Persian rule. But notwithstanding the occasional discrepancies produced by careless or fraudulent copyists, these "dynasties" of Manetho are of the highest value to Egyptian history, and their general authenticity has been fully established by comparison with the monuments. They comprise 31 dynasties, which reigned successively in Egypt, numbering upward of 300 kings, the sum of the years of whose reigns from Menes to Nectanebo II., 351 B. C., was 3,555 years. "This succession of time," says Bunsen, "the vastest hitherto established any where in the old world, is now also the best authenticated. It is based upon lists of kings and their regnal years; and these lists are corroborated and elucidated by contemporary monuments up to the 4th dynasty, with slight breaks; an authentication which is as unexampled as its extent." The era of Menes, according to Bunsen, was 3643 B. C.; according to Lepsius, 3893. Wilkinson remarks of Menes that the frequent occurrence of a similar name in early history, as Manes, the first king of Lydia, the Phrygian Manis, the Minos of Crete, the Indian Menu, the Thibetian Mani, the Siamese Manu, the German Mannus, and others, may seem to assign him a place among mythical beings, but that the Egyptians themselves believed him to be a real personage, and accepted the recorded events of his reign as undoubted facts. He, however, declines in his latest publication to assign to Menes any date, for the alleged reason that no certain era has been established in early Egyptian chronology. In his previous works he had adopted the date of 2950 B. C. as the most probable. It is a point still in dispute among Egyptologists whether the first 17 dynasties which succeeded Menes were consecutive. It is maintained by those who are disposed to assign to the beginning of Egyptian history the remotest date, that the dynasties, with inconsiderable exceptions, were consecutive, and that the kings enumerated reigned over the whole of Egypt. By most writers on the subject it is held that many of the dynasties were contemporaneous, and that 2 or more kings reigned at the same time over different parts of Egypt. It is admitted by all that the 18th dynasty and those which succeeded it reigned over the whole of the country. Bunsen divides the dynasties and the history of Egypt under them into 3 great masses: 1, the old empire, from Menes to Amyntimæus, including the first 12 dynasties of Manetho and part of the 13th, and embracing a period of 1,076 years; 2, the middle period, or the period of the shepherd kings, 922 or 929 years; 3, the new empire, from the 18th to the 30th dynasty, about 1,300 years. Lepsius dissents from this arrangement in some respects, and reckons the length of the first period at 1,286 years instead of 1,076. He also maintains that there always were native Egyptian dynasties contemporary with the shepherds, and divides the dynasties merely into the old empire and the new. Wilkinson, however, regards this division into the old and new empires as purely arbitrary and unnecessary. The capitals of the 1st and 2d dynasties seem to have been in Upper Egypt, but the seat of the 3d dynasty was at Memphis in Lower Egypt. The kings of the 4th dynasty, who reigned also at Memphis as early at least as 2450 B. C., were builders of pyramids, which were intended for their tombs. The monuments show that at this period the Egyptians had already made great advances in the arts and habits of civilized life. The masonry of their buildings was equal to that of any other period, ancient or modern, and their sculpture of the human form was better than it was in a later and more conventional age. The art of making glass was known, and the furniture, costumes, implements of trades and agriculture, and the manners and customs of the people, are apparently as indicative of a refined civilization as at any subsequent period. Two brothers of this dynasty, who seem to have reigned together, Suphis or Shufu I. and II., the Cheops of Herodotus, were the builders of the great pyramid, which was their tomb and in which their names have recently been found inscribed. The second pyramid was built by Shafré or Sephres, the Cephren of Herodotus, and the 3d pyramid by Menkaré or Moncheres, whom Herodotus calls Mycirinus. A portion of his coffin, taken from his pyramid by Gen. Vyse a few years ago, is in the British museum. The 6th dynasty, according to some authorities, immediately succeeded the 4th at Memphis, while the 5th at the same time reigned in Upper Egypt. At the end of the 6th dynasty, according to Wilkinson, 2240 B.C., Lower Egypt was conquered by invaders from Asia, who established themselves at Memphis and made the sovereigns of Upper Egypt their tributaries. These invaders were called by the Egyptians shepherds, and their kings, of whom several dynasties reigned at Memphis, are called the

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shepherd kings. Nothing whatever is known of their origin, but it has been conjectured that they were a pastoral race, either Arabs, Scythians, or Tartars, who emigrated from their native seats and conquered Egypt, as in later ages the Goths, Huns, Mongols, Magyars, and Turks subdued and occupied remote countries. The date of their inroad into Egypt is placed by Bunsen at about 2567 B. C. Lepsius, on the contrary, computes it to have been more than 500 years later, at about 2000 B. C. The 12th dynasty began about 2000 B. C., according to Wilkinson. Its capital was Thebes, and several of its monarchs, among others 3 of the name of Osirtasen or Sesortasen, were highly distinguished. Osirtasen I. was a conqueror, who seems to have carried his arms southward into Ethiopia, and to have regained nearly the whole of Egypt from the shepherd kings, who, however, still held Memphis, and part of Lower Egypt. He is supposed to have been the original Sesostris, so famous among the Greeks, though in after ages a still greater monarch and conqueror, Rhamses II., became confounded with Osirtasen I., and the achievements of both were attributed to a single Sesostris by the Greek historians and poets. Osirtasen III. also made conquests in Ethiopia, and his memory was so highly respected that divine honors were paid to him long after his death by some of the kings of the 18th dynasty. By some Egyptologists he also is supposed to have been the prototype of Sesostris. Osirtasen I. built the temple of Heliopolis, where to this day stands one of the finest obelisks in Egypt, erected by him and inscribed with his name. He also excavated the principal of the grottos of Beni Hassan, in which the arts, manners, and customs of his age are vividly depicted with a minuteness and variety of detail that have given us a better acquaintance with the domestic life of Egypt 4,000 years ago than we have with the same feature of European existence 3 or 4 centuries since. Under the next dynasty, the 13th, about 1860 B. C., the shepherd kings seem to have recovered their supremacy in Egypt, and to have driven the Theban monarchs to take refuge in Ethiopia. Under several dynasties the conquerors held the country till Amés or Amosis, the first king of the 18th dynasty, who brought aid from Ethiopia, headed a successful revolt of the Egyptians, and drove the shepherds out after a long struggle, which ended with the capitulation of their last stronghold, the frontier city of Avaris, from which they withdrew into Syria. According to Wilkinson, this took place about 1500 B. C., after the shepherds had possessed Egypt 511, or at the most 625 years. According to Bunsen, the shepherds were expelled in 1548 B. C., after having occupied Egypt under 43 kings for 922 or 929 years. He attributes their final expulsion to Tuthmosis III., a grandson of Amosis, though he maintains that Amosis recovered the greater part of Egypt from their grasp and reëstablished the throne of the Pharaohs in Memphis. Tuthmosis III. is called Thothmes III. by Wilkinson, who says that his reign was one of the most distinguished in the history of the Pharaohs. He extended his arms far into Asia, from which he received a large tribute; and the elephants and horses, the rare woods, bitumen, rich gold and silver vases, ebony, ivory, giraffes, apes, gold dust; ingots, and rings, pictured on the monuments of his reign, show not only the value of the tributes, but the distance from which they were brought. "The great additions he made to Karnak and other temples in Thebes," says Wilkinson, "and the remains of monuments bearing his name at Memphis, Heliopolis, Coptos, Ombos, and other cities in different parts of Egypt, show how much was done by Thothmes to beautify them and to commemorate the glories of his reign; and the style as well as the high finish of his sculptures were not much surpassed at any subsequent period. He has left more monuments than any Pharaoh except the second Remeses." Rosellini, the distinguished Italian Egyptologist, remarks that there is hardly an ancient city in Egypt and Nubia, as far as the second cataract beyond Semneh, where remains of the edifices of Thothmes III. are not to be found. Thothmes IV., his grandson, caused the great sphinx at the pyramids to be cut out of the rock. Amunoph or Amenophis III., another king of this 18th dynasty, was known to the Greeks and Romans as Memnon, and his colossal statue at Thebes was the famous vocal statue which was supposed to salute the sunrise with a clear-toned sound. His conquests and his power were very extensive, his empire comprising Ethiopia, a large part of Arabia, Syria, and Mesopotamia, and he is supposed to have introduced innovations or heresies in the national religion of Egypt, and to have prepared the way for the great religious revolution which took place under the "stranger kings," as the Egyptians termed them, by 7 of whom he was followed in immediate succession. Of these monarchs very little is known. They seem to have been usurpers or invaders of foreign race, to have ruled tyrannically, and to have supplant- the national gods of Egypt by the worship of the sun. Their capital was at or near the modern village Tel-el-Amarna in Middle Egypt. Their memory was so detested by the Egyptians that after their expulsion from the throne their monuments and inscriptions were everywhere destroyed or defaced. Their reigns were short, not more than 30 years in all, according to Wilkinson's calculation, and terminating about 1324 B. C. It was in the reign of Pthahmen, one of these kings, that Wilkinson supposes the exodus to have taken place, when the children of Israel went forth out of the land of Egypt under the leadership of Moses and Aaron. Bunsen coincides with this view of the date of the exodus, though he gives the name of the Pharaoh who ruled Egypt at the time as Menephthath. The date he fixes at 1320 B. C. Abraham he supposes to have visited Egypt about 2876 B. C. in the reign of a Pharaoh of the 8th dynasty, and Jacob to have settled in the land of Goshen with his family in the 9th year of Osirtasen I., 2754

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B. C. The length of the sojourn of the Israelites in Egypt he thus computes at 1,434 years. The 19th dynasty, which began about 1324 B. C. with Rhamses I., reigned during the most illustrious period of Egyptian history, when the extent and power of the empire were at their highest pitch, and when the most splendid monuments were erected at Thebes, and in fact throughout the country. The great monarchs of this dynasty were Sethos or Sethi I. and Rhamses II., the son and grandson of Rhamses I., the founder of the line. Sethos made extensive conquests in Africa and Asia, and waged successful wars with the Assyrians and Medes. He built many superb edifices at Thebes, among others the great hall of Karnak, on the walls of which his victories are sculptured, and his tomb excels all others in Egypt in the beauty and richness of its sculptures and paintings. According to Bunsen, Sethos, or Sethosis, as he calls him, was the true original of Sesostris, the celebrated hero of Egypt. Rhamses II., his son, reigned 66 years, and, inheriting a mighty empire and a great and veteran army, achieved brilliant victories over the surrounding nations, and erected numerous monuments by the labor of the captives whom he brought home from his campaigns. Wilkinson, on the contrary, though admitting the glory and power of Sethos, considers his son the greater monarch and the true Sesostris. He fixes the beginning of his reign at 1311 B. C., and says that this period may be regarded as the Augustan age of Egypt, in which the arts attained to the highest degree of excellence of which they were then capable. A century later, after several obscure and feeble reigns, Rhamses III. of the 20th dynasty revived the martial renown of his name, and penetrated to remote countries in Asia, to which the arms of Egypt had never before reached. He seems even to have encountered and defeated some Tartar nations. With him, says Wilkinson, closes the glorious era of Egyptian history. Rhamses VIII., however, whose reign began 1171 B. C., maintained the foreign possessions of Egypt, and has left some striking monuments on which his own portrait, conspicuous for the high bridge of his nose, is yet to be seen. The first king of the 22d dynasty was Sheshonk I., 990 B. C. He was the Shishak of the Scriptures (1 Kings, xi. 40), who was contemporary with Solomon; and in the 5th year of Rehoboam, king of Israel, he captured Jerusalem and pillaged the temple. The sculptured record of this campaign is still to be seen on the wall of the great temple of Karnak, with the name of Juda Melchi, or kingdom of Judah, yet legible, together with the portrait of a captive with strongly marked Jewish features. From the time of Sheshonk Egypt declined in power, not improbably because of the rapid growth at this period of the Assyrian empire. At the beginning of the reign of Psammenitus, the last king of the 26th dynasty, 525 B. C., Egypt was conquered by Cambyses, and became a Persian province governed by a satrap. The people frequently revolted and were as often subdued, but at length, about 411 B. C., they succeeded in driving out the Persians, and with the aid of Greek auxiliaries maintained their independence under a series of native monarchs, the last of whom was Nectanebo II., who was conquered and dethroned by Ochus or Artaxerxes III., in 351 B. C. Egypt continued a Persian province, however, only till 332 B. C., when it was conquered by Alexander the Great.—Of the manners and customs, mode of life, and social condition of the ancient Egyptians, we can form a very satisfactory opinion from the representations on the monuments. It is evident from their testimony that at a very early age the Egyptians were a highly civilized people, wealthy, industrious, with a fully organized society, and great proficiency in arts, manufactures, and agriculture. Of their literature we know little, the few remains that have reached us being too scanty to enable us to judge with confidence of the general character of their intellectual productions. A large number of papyri have been found, containing writings, some of a historical and others of a religious nature, but they have not yet been so perfectly deciphered as to be fully understood. The religious documents all belong to one work, which was called by Champollion the "Funeral Ritual," but which Lepsius terms the "Book of the Dead." This work, which seems to be alike poor in matter and style, consists chiefly of prayers and of instruction about the future life. The historical papyri relate to the exploits of some of the kings, which are told in a bombastic manner. A very curious romance or fairy tale of the age of the 19th dynasty has been discovered and translated into French. Some collections of letters written by scribes, a biographical memoir of a scribe, and a number of miscellaneous fragments have also been found. The progress of the Egyptians in sculpture and painting was hampered by religious restraints which prevented their development beyond a point which was early reached. In architecture, however, they occupy perhaps the most distinguished place among the nations. No people has equalled them in the grandeur, the massiveness, or the durability of their structures. A competent authority, Fergusson, the author of the "Illustrated Handbook of Architecture," says: "Taken altogether, perhaps it may be safely asserted that the Egyptians were the most essentially a building people of all those we are acquainted with, and the most generally successful in all they attempted in this way. The Greeks, it is true, surpassed them in refinement and beauty of detail, and in the class of sculpture with which they ornamented their buildings, and the Gothic architects far excelled them in constructive cleverness; but beside these, no other style can be put in competition with them. At the same time neither Grecian nor Gothic architects understood more perfectly all the gradations of art, and the exact character that should be given to every form and every detail. They understood, also, better

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than any other nation, how to use sculpture in combination with architecture, and to make their colossi and avenues of sphinxes group themselves into parts of one great design, and at the same time to use historical paintings, fading by insensible degrees into hieroglyphics on the one hand, and into sculpture on the other, linking the whole together with the highest class of phonetic utterance, and with the most brilliant coloring, thus harmonizing all these arts into one great whole, unsurpassed by any thing the world has seen during the 30 centuries of struggle and aspiration that have elapsed since the brilliant days of the great kingdom of the Pharaohs."—Of the religious system of the Egyptians we possess very scanty information. The people worshipped many gods, and each city or district had its tutelar deity, who in that place was particularly adored, while in the rest of the country he was little regarded. The principal gods were Osiris and Isis, who were worshipped throughout Egypt; Amun, or Ammon, who like Jupiter was held to be the "king of gods," the especial tutelar deity of Thebes; Noum, the god of the cataracts and oases, who in later times under the Romans was called also Ammon, and considered the same as Jupiter; Sálé, his wife, who corresponded to Juno; Phthah, the Memphian deity, who symbolized the creative power; the goddess Neith, worshipped at Sais, who may be compared to Minerva; Kem, who represented universal nature, and particularly the generative principle, and whose chief temples were at Coptos and at Chemmis; the goddess Pasht, whose worship prevailed at Bubastis, and who corresponded to the Artemis or Diana of Greek and Roman mythology; Maut, the maternal principle; Re or Phrah, the sun; Seb, the earth, who was called "father of the gods;" Nepte, the sky, wife of Seb, the "mother of the gods;" Moui, the sunlight; Atmou, the darkness; Thoth, the intellect. Other noted deities were Khons, Anouke, Tafne, Savak, Eileithyia, Mandou, Seth, Nepthys, Horus, and Athor. A great variety of abstract principles and even of animals and vegetables were however worshipped by the multitude, though the doctrine of one God was privately taught by the priests to a select few. To each deity an animal seems to have been held sacred, which was probably regarded as his symbolical representative. Bulls were consecrated to Osiris and cows to Athor; the sacred bull of Memphis, called Apis, being particularly venerated throughout Egypt. A hawk was the symbol of Re, the ibis of Thoth, the crocodile of Savak, and the cat of Phthah. Of the doctrines of the Egyptian religion little is accurately known. The existence of the spirit after death was believed, and a future state of rewards and punishments inculcated, in which the good dwelt with the gods, while the wicked were consigned to fiery torments amid perpetual darkness. It was believed that after the lapse of ages the spirit would return to the body, which was therefore carefully embalmed and preserved in elaborately constructed tombs.—The government of Egypt was a monarchy, limited by strict laws and by the influence of powerful hereditary privileged classes of priests and soldiers. The priests were the ruling class. They were restricted to a single wife, and if polygamy was permitted to the rest of the people, it must have been very seldom practised. The marriage of brothers and sisters was permitted. The laws were wise and equitable, and appear to have been rigidly enforced. Murder was punished with death, adultery by bastinadoing the man and by cutting off the nose of the woman, forgery by cutting off the culprit's hands. Imprisonment for debt was not permitted, but a man could pledge to his creditors the mummies of his ancestors, and if he failed in his lifetime to redeem them, he was himself deprived of burial. Women were treated with respect, and the laws and customs seem to have been so favorable to them that their condition in Egypt was much higher than in any other nation of antiquity. The military force of Egypt was a species of hereditary militia, which formed one of the leading classes or castes, and in time of peace cultivated the land, of which it held a large portion. The king's guards, some few thousands in number, were the only standing army. The number of soldiers in the military caste is stated by Herodotus at 410,000, which probably included all the men of that class able to bear arms. It is not probable that the whole of them ever were or could be brought into the field at once. Their arms were spears and swords, and they were protected by large shields. They were distinguished for their skill as archers, and also used the sling. They do not seem to have been well supplied with cavalry, though they made much use of war chariots.—The researches of modern investigators have established the fact that the ancient Egyptians were of the Caucasian type of mankind, and not of the negro. Their language bore unmistakable affinities to the Semitic languages of western Asia, such as the Hebrew and the Arabic. Herodotus, it is true, speaks of them as black and woolly haired, but the mummies, of which immense numbers remain, prove that his words are not to be taken literally. The shape of their skulls is Asiatic, not African; and the paintings on the monuments show that they were neither black like the negro nor copper-colored like some of the Ethiopian tribes. The true negroes are distinctly represented on the monuments, and in a style of caricature which the Egyptians would not have applied to themselves. There is, however, reason to believe that the Egyptians had mixed largely with the negroes, and from the positive statements of Greek and Roman eye-witnesses there can be no doubt that they were of very dark complexion. We have no certain knowledge of the amount of population under the Pharaohs. By some of the Greek and Roman writers the number of inhabitants at the most flourishing periods is stated to have been

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7,000,000, a prodigious amount for so small a country, the average number to the square mile, exclusive of the desert, being twice as large as in the most densely peopled lands of modern times. Still, so great was the fertility of Egypt that the statement is not improbable. The cultivable land is somewhat greater in extent now than it was in antiquity, owing to the wider spread of the inundation of the Nile; and it is computed that if properly tilled it would yield more than is requisite for the food of 8,000,000 people, though without allowing any considerable surplus for exportation. Under the ancient Pharaohs little or no corn was exported, and the land seems to have been carefully cultivated. Another statement of the Greeks and Romans, that at the height of her prosperity there were in Egypt 20,000 cities, is altogether preposterous. The country contained several large and populous cities, the most considerable of which were Thebes, Latopolis, Apollinopolis, Syene, in Upper Egypt; Memphis, Heracleopolis, Arsinoë, in Middle Egypt; Heliopolis, Bubastis, Leontopolis, Sais, Busiris, Naucratis, Mendes, Tanis, Pelusium, in Lower Egypt. At the lowest computation these great cities can scarcely have contained in the aggregate less than 2,000,000 people, which, deducted from the 7,000,000 of total population, would have left but an average of 250 inhabitants to each of the 20,000 cities.—The conquest of Egypt by Alexander the Great was much facilitated by the hatred of the natives to their Persian masters. They welcomed the Greeks as deliverers, and with reason, for with the rule of Alexander came trade, learning, science, the arts, and just and stable government. He conciliated the priests by sacrificing to the sacred bull Apis, whom the idol-hating Persians had treated with indignity; and in order to restore to the people their ancient laws and usages, he established two judgeships, with jurisdiction over the whole country, and appointed two eminent Egyptians to these offices, directing also all the Greek officers to regard the customs of Egypt in administering the government. But the greatest and most permanent benefit which the Macedonian conqueror bestowed upon Egypt was the foundation of Alexandria, whose capacities to be made a port of the first class and an emporium for the commerce of the eastern Mediterranean he perceived at a glance while passing through the place on his way to visit the oracle of Ammon. The city which he ordered to be built there rose rapidly to importance, and in a few years became one of the great capitals of the world and the chief centre of Greek civilization. Alexander effected not merely a political, but a social and intellectual revolution in Egypt, which for a thousand years after the conquest remained essentially a Greek country—the Greeks being the dominant if not the most numerous race. After the death of Alexander, 323 B. C., and the division of his empire among the Macedonian captains, Egypt became subject to Ptolemy, surnamed Soter, an able and enlightened ruler, who after a splendid reign of 38 years abdicated in favor of his son Ptolemy Philadelphus, and died two years afterward. The early part of the reign of Ptolemy Philadelphus was disturbed by civil war with his rebellious brothers, two of whom he put to death. The domestic state of Egypt was greatly improved under his administration, and Upper Egypt, which had been in a turbulent condition for half a century, was reduced to order and made safe for merchants and other travellers. The port of Berenice on the Red sea was constructed, and the city of Arsinoë was built where Suez now stands. Ptolemy also built other cities on the Red sea to facilitate the trade with India, which was at that time extensive and profitable. The museum of Alexandria and its famous library, both founded by Ptolemy Soter, were now at the height of their prosperity. Demetrius Phalereus was librarian, Euclid was head of the mathematical school, and the poets Theocritus, Callimachus, and Philætus were reckoned among the ornaments of the court. The Jews at this time were very numerous in Egypt, and with the king's sanction the Septuagint version of the Old Testament was made from the Hebrew into the Greek by 70 or 72 Jewish scholars. The dominions of Ptolemy beside Egypt comprised a considerable part of Ethiopia, together with Palestine, Cœle-Syria, Pamphylia, Cilicia, Lycia, Caria, Cyprus, and the Cyclades. His army is said to have numbered 200,000 foot and 20,000 horse, 2,000 chariots, 400 elephants, and a navy of 1,500 ships of war and 1,000 transports. Commerce and the arts, science and literature, directed by Greek genius and Greek energy, were carried to a height of splendor that rivalled the brightest days of the elder Pharaohs. Alexandria, the capital, was a superb city, adorned with magnificent edifices, and preëminent throughout the civilized world as a seat of learning, science, and trade. Ptolemy Philadelphus reigned like his father 38 years, and was succeeded by his son Ptolemy Euergetes, who had a brilliant and prosperous reign of 25 years. He rebuilt many of the great temples of Egypt and founded others, and his court was thronged by artists and authors. Under his profligate and tyrannical son, Ptolemy Philopator, the kingdom began to decline; and in the reign of the next king, Ptolemy Epiphanes, a minor, the king's guardians were forced to invoke the protection of the Romans against the ambitious designs of the sovereigns of Syria and Macedonia, who had formed a combination against Egypt. The result of their interference was that after a century and a half of turbulence and misrule, under 8 sovereigns bearing the name of Ptolemy, the last of whom, Ptolemy XII., reigned jointly with his sister and wife, the famous Cleopatra, Egypt was reduced to the condition of a Roman province by Augustus Cæsar, 30 B. C. It remained subject to the emperors of Rome for more than 3 centuries, with the short and doubtful exception of a period when it may have been held by Zenobia, the queen of Palmyra. It was

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looked upon as the most valuable of the provinces of the empire, as the granary of Rome, upon whose harvests the idle and turbulent millions of the imperial metropolis depended for their daily bread. Its history during this long period is a record only of fruitless rebellions and of savage persecutions of the Christians, whose religion was early introduced and made rapid progress. After the transfer of the seat of the empire to Constantinople, A. D. 330, the Christians of Egypt triumphed over the pagans, and for another period of 3 centuries its history presents little but theological contests, which not unfrequently broke out into civil strife. The first of these contests was the Arian controversy—Arius, who was pronounced a heretic by the council of Nice (325), being a presbyter of the church of Alexandria, while Athanasius, his orthodox opponent, was archbishop. By the emperor Constantius II. Athanasius was removed from his see and an Arian appointed in his place, while the orthodox Christians were grievously persecuted. When Julian the Apostate became emperor, the pagan mob of Alexandria rose against the Christians and murdered the Arian archbishop, and Athanasius finally regained the archiepiscopate. After his death the emperor Valens appointed an Arian to succeed him, and the persecutions of the orthodox were renewed. Theodosius I., in 379, issued stringent edicts against paganism, which still held its ground, especially in Alexandria, where it numbered among its adherents most of the learned and scientific classes and the students in the schools of philosophy. In compliance with the orders of the emperor, the pagan temples were broken into by the Christians and the statues of the deities destroyed or overthrown. The great temple of Serapis, which had been for ages the most sacred and celebrated of pagan fanes, was plundered and desecrated, and its library of 700,000 volumes despoiled by the mob. The pagans resented these outrages, and took arms in defence of their religion; but after several battles had been fought in the streets, the Christians were victorious, and the pagan leaders were driven from the city. In the reign of Theodosius II., the celebrated Cyril, archbishop of Alexandria, in 414 raised a persecution of the Jews, who were numerous and wealthy, and himself headed a mob which attacked and plundered the synagogues, and in one day expelled every Jew from the city. The pagans were next assailed, and one of their most popular teachers of philosophy, the beautiful and learned and eloquent Hypatia, daughter of Theon the mathematician, was dragged from her chariot as she passed through the street, carried into a church, and brutally murdered. At a later period, the theological controversies of Egypt culminated in the complete separation of the Coptic or Egyptian church from the orthodox, whose bishops held a council at Chalcedon in 451, and denounced the Egyptian doctrines as heretical. The bitter animosities generated by these contests alienated the Egyptians from the government at Constantinople, so that they made no opposition when in the reign of Heraclius, in 616, the country was overrun by the forces of the Persian king Chosroes, who held it 10 years, until the outbreak of Mohammedanism so harassed the Persians that Heraclius was enabled to recover the province, only however to lose it for ever a few years later in 640, when it was conquered by the Arabs, led by Amrou the general of the caliph Omar. For more than 2 centuries after the Mohammedan conquest Egypt remained a province of the caliphate, the seat of which was transferred from Medina to Damascus, and from Damascus to Bagdad. In 868 Ahmed the viceroy threw off his allegiance to the caliph and established an independent kingdom, which lasted 87 years, when the caliphs again reduced it to subjection. After a long period of anarchy, Moez, the 4th of the Fatimite caliphs, who reigned in northern Africa, and were rivals of the caliphs of Bagdad, conquered Egypt, in 970, and building the city of Cairo, made it the seat of his government. The Fatimite dynasty ruled Egypt for 2 centuries. The most distinguished of them was Hakem (died 1021), the prophet and Messiah of the Druses, who still look for his return to earth. Adhed, the last of the Fatimites, died in 1171, and was succeeded by his vizier or prime minister, the renowned Saladin, the chivalrous and successful adversary of the crusaders. He took the title of sultan of Egypt, and at his death in 1193 was sovereign of a vast empire which his sons divided among themselves, Egypt falling to the share of Aziz. Successive invasions by the crusaders harassed Egypt for the following century, but they were all repelled by the descendants of Saladin, with signal loss to the Christians. The last and most disastrous of these attacks was made by Louis IX. of France in 1248, who landed with a large army and the flower of the French chivalry at Damietta, but after some successes was defeated and compelled to capitulate with the loss of 30,000 men. A remarkable revolution next took place in Egypt. Saladin and his successors had organized a numerous body of guards, called Mamelukes, composed exclusively of slaves of Turkish origin, brought from the countries around the Caspian sea. They gradually acquired such power and influence that at length they deposed their lawful sovereign and made one of their own number sultan. For 120 years these mercenaries controlled the destinies of Egypt, making and unmaking sultans at their pleasure. At length, at the close of the 14th century, the Circassians, from whom the ranks of the Mamelukes had long been largely recruited, overthrew the power of the Turkish Mamelukes and took the government into their own hands. Another century of anarchy succeeded, and in 1517 Egypt was conquered by the Ottoman sultan Selim I. and reduced to a Turkish province. Some of the Mameluke sultans were men of talent and energy, and under their rule Egypt was at times the centre of an extensive though fluctuating em-

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pire. The arts were cultivated with some success, as is shown by the mosques and tombs of these sultans at Cairo, which justly rank among the most magnificent and elegant specimens of Saracenic architecture. Under their sway Cairo became what it has ever since remained, the chief seat of Mohammedan learning and intellectual cultivation. For 2 centuries the Turkish pashas ruled Egypt, which decayed under their rule like all the lands subjected to it. But in the 18th century the Mamelukes, who still constituted the military force of the province, gradually regained their former power to such an extent that in 1768, under the lead of their ablest and most influential chief, Ali Bey, they threw off the Turkish yoke and declared Egypt independent. At the end of 4 years, however, Ali Bey was betrayed and poisoned, and the authority of the sultan was nominally reëstablished in 1772. Confusion and civil war between the different factions of the Mamelukes continued to prevail until in 1798 the invasion of Egypt by Napoleon Bonaparte united their chiefs in self-defence. Their famous cavalry made a gallant resistance to the French, but was forced to give way before the science and tactics of Europe. In the battle of the Pyramids the Mameluke army was nearly annihilated. The French conquered the whole of Egypt, and held it till 1801, when they were expelled by a British army under Generals Abercromby and Hutchinson. After the departure of the French civil war broke out afresh between the Turks and the surviving Mamelukes, which resulted, in 1805, in the elevation to the post of pasha of Mehemet Ali, an Albanian adventurer who had become leader of one of the contending factions. His authority, however, was not firmly established until after a long struggle with the Mamelukes, 500 of whom he perfidiously massacred in 1811. The dispirited survivors fled to Nubia, and since the massacre the internal tranquillity of Egypt has not been seriously disturbed. Mehemet Ali introduced great reforms in Egypt, in the system of administration, and in the organization of the army and navy. With the aid of European and American adventurers he armed and disciplined in the European manner a large native force, and created a respectable fleet. Manufactures of arms, cloths, and other important articles were introduced and sedulously fostered; the commerce of Alexandria, which had dwindled almost to nothing, was revived, and the population of the city was increased tenfold during his reign. Egypt, firmly and moderately governed, enjoyed a state of peace and good order to which it had been a stranger for centuries, and attained a commanding position among the surrounding nations. The pasha aimed at complete independence, and so great were his resources that in 1831–'32–'33 he waged a highly successful war with the Turkish sultan, conquered Syria and a great part of Asia Minor, and would have made himself master of Constantinople had not the European powers interfered to arrest the progress of his army, and avert the overthrow of the Ottoman empire. In 1848 Mehemet Ali, at the age of 80, grew imbecile, and his son Ibrahim was invested with the pashalic. Ibrahim died at the end of 2 months, and was succeeded by his nephew Abbas, an ignorant and profligate fanatic, who was bigotedly opposed to the reforms introduced by his grandfather, and, immersed in sensual gratifications, paid no attention to the duties of his post. Mehemet Ali died, Aug. 3, 1849. Abbas died suddenly, not without suspicion of violence, in July, 1854. He was succeeded by the present ruler, Said Pasha, the 4th son of Mehemet Ali, a man of energy and intelligence, who thus far has governed wisely and humanely, and has carried out the enlightened plans of his father with some modification of certain objectionable features by which they were defaced. Under his auspices Egypt appears to be gradually advancing toward that position among the nations to which she is entitled by her inexhaustible resources and unrivalled geographical position.—For further information on Egypt generally, see CAIRO, COPTS, NILE. The subjects of HIEROGLYPHICS and the PYRAMIDS will be treated under those titles respectively, and articles upon the chief cities and personages of Egyptian history will be found under their proper heads. The discoveries of modern travellers in Egypt will be noticed under the names of the travellers. The following is a list of some of the most important works on Egypt and Egyptian subjects: Bunsen, *Aegyptens Stelle in der Weltgeschichte* (5 vols. 8vo., Hamburg and Gotha, 1845–'57; English translation, by Charles H. Cottrell, 3 vols. 8vo., London, 1848–'58 *et seq.*); Lepsius, *Denkmäler aus Aegypten und Aethiopien* (Leipsic, 1849–'58 *et seq.*), *Briefe aus Aegypten*, &c. (Berlin, 1852; English translation, London, 1855); Brugsch, *Reiseberichte aus Aegypten* (Leipsic, 1855); Uhlemann, *Handbuch der gesammten Aegyptischen Alterthumskunde* (4 vols. 8vo., Leipsic, 1857–'8); Denon, *Voyage dans la basse et la haute Égypte* (2 vols. fol., Paris, 1802), *Description de l'Égypte* (26 vols. 8vo., and 12 vols. fol. of plates, new ed. Paris, 1820–'30); Champollion, *L'Égypte sous les Pharaons* (2 vols. 8vo., Paris, 1814), *Lettres*, &c. (8vo., Paris, 1833), *Monuments de l'Egypte et de la Nubie* (folio, Paris, 1843); Mariette, *Choix de monuments et de dessins découverts ou exécutés pendant le déblaiement du Serapéum de Memphis* (4to., Paris, 1856), *Mémoires*, &c. (1856); Merruau, *L'Égypte contemporaine* (8vo., Paris, 1858); Rosellini, *Monumenti dell'Egitto e della Nubia*, &c. (8vo., folio plates, Pisa, 1840); E. W. Lane, "Manners and Customs of the Modern Egyptians" (2 vols. 8vo., 3d ed. London, 1842); Samuel Sharpe, "History of Egypt from the Earliest Times to the Conquest by the Arabs" (8vo., London, 1846); Sir J. G. Wilkinson, "Manners and Customs of the Ancient Egyptians" (5 vols. 8vo., London, 1847), "Handbook for Travellers in Egypt" (London, 1847), "A Popular Account of the Ancient Egyptians" (2 vols. 12mo., Lon-

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don, 1854), Notes and Appendices to Rawlinson's "Herodotus" (London, 1858–'9); John Kenrick, "Ancient Egypt under the Pharaohs" (2 vols., London and New York, 1852). See also the travels of Savary, Sonnini, Belzoni, J. A. St. John, Harriet Martineau, Mrs. Poole, J. L. Stephens, the late Bishop Wainwright, Dr. Robinson, G. W. Curtis, Bayard Taylor, W. C. Prime, &c.

EHNINGER, JOHN WHETTON, an American artist, born in New York, July 22, 1827. He was graduated at Columbia college in 1847, and shortly after went to Europe to pursue his art studies. In 1848–'9 he was a pupil of Couture in Paris, and between 1851 and 1853 he made long visits to Düsseldorf and the chief capitals of the continent. His first oil painting, "Peter Stuyvesant" (1850), the subject of which was taken from "Knickerbocker's History of New York," was engraved by the American art union. Among his best works executed since that time are "Love me, love my Horse," "The Sword," the "Foray," the landscape of which is by Mignot, "Lady Jane Grey," and *Ars Celare Artem*, the latter now owned in Washington. He has also produced some excellent etchings and drawings in outline, pencil, and India ink. Of the former, a series illustrating Hood's "Bridge of Sighs" was published in 1849, and in 1850 another on subjects from Irving's story of "Dolph Heyliger." Of his pencil drawings the composition entitled "Christ healing the Sick," executed in 1857, and now in the possession of the Rev. Dr. Anthon of New York, is among his latest and best works. In 1858, soon after the appearance of Longfellow's "Miles Standish," he prepared a set of 8 illustrations of the poem, which were copied by the photographic process, and obtained a considerable popularity. Mr. Ehninger has of late devoted much time to perfecting a system of photographic etching.

EHRENBERG, CHRISTIAN GOTTFRIED, a German naturalist and microscopist, born at Delitzsch, April 19, 1795. He was educated at Schulpforte, till in 1815 he went to the university of Leipsic, where after a short study of theology he devoted himself to medicine. He continued his studies at Berlin, where he received the degree of M.D. in 1818, publishing on the occasion a dissertation entitled *Sylvæ Mycologicæ Berolinenses*, in which he gave an account of 248 species of cryptogamous plants found by him around Berlin, 62 of which had till then been unknown. In 1820 he was enabled to gratify a long cherished wish to travel for the purpose of scientific exploration, being appointed with his friend Hemprich by the Berlin academy of sciences to make a scientific journey in Egypt, whither Gen. Minutoli was then going for antiquarian researches. During 6 years he explored the natural history of Egypt, Nubia, and Arabia, narrowly escaping from fevers which caused the death of his companion, and returned to Berlin in 1826. He was at once appointed extraordinary professor (ordinary in 1839) of medicine in the university of Berlin, and published a narrative of his travels and observations (Berlin, 1828). The new species which he had discovered were described in a series of *Symbolæ Physicæ Mammalium, Avium, Insectorum, et Animalium Evertebratorum*, published between 1828 and 1834. Other scientific results of his journey were contained in his works on *Die Korallenthiere des Rothen Meeres* (Berlin, 1834), and *Die Akalephen des Rothen Meeres*, &c. (Berlin, 1836). In 1829 he accompanied Alexander von Humboldt in his expedition to the Ural mountains, which was prolonged to the Altai; and during this journey he began to apply himself to microscopic investigations, by which he has since made highly important discoveries, and may be said to have created a scientific knowledge of the infusoria. Among the larger works which embody the results of his researches with the microscope are the *Organisation, Systematik, und geographisches Verhältniss der Infusionsthierchen* (Berlin, 1830; additions were made in 1832, '34, and '36), and the more complete *Infusionsthierchen als vollkommene Organismen* (Leipsic, 1838), illustrated with 64 fine copperplates, which, from the elegant style in which it was issued, as well as from its scientific contents, is reckoned among the ornaments of German literature.

Prior to Ehrenberg the infusoria were considered as scarcely organized, but he ascertained that they have an internal structure resembling that of the higher animals, and discovered in them muscles, intestines, teeth, different kinds of glands, eyes, and nerves. The astonishing minuteness of his observations appears from his estimate that the size of the smallest colored spots on the body of *monas termo* (the diameter of which is only $\frac{1}{2888}$ of a line) is $\frac{1}{2888}$ of a line. So great are the powers of reproduction in these animalcules, that from one individual (*hydatina senta*) he observed that 1,000,000 were produced in 10 days; on the 11th day, 4,000,000; and on the 12th day, 16,000,000. In pursuing his studies he made, partly by accident, the discovery of fossil infusoria, which form an important element in many of the strata of the earth's surface; and he showed the similarity of their phenomena in 3 different parts of the world in his *Bildung des Europäischen, Libyschen, und Uralischen Kreidefelsens und Kreidemergels aus mikroskopischen Organismen* (Berlin and Leipsic, 1839). That black earth consists of infusoria he had before stated in a special treatise. He made the same discovery in 1841 concerning the peat soil which underlies a large portion of Berlin. In his treatise on *Das Leuchten des Meeres*, which is a model of acute investigation, he attributes the appearance of shining bodies in the sea to the agency of microscopic sea animals. A similar application of his discoveries he made in his *Passat-, Staub-, und Blutregen* (Berlin, 1849), proving the existence and operation of animalcules in the atmosphere. The most important of his other works are the *Verbreitung und Einfluss des mikroskopischen Lebens in Süd- und Nord-Ame-*

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rika (Berlin, 1842), the *Mikrogeologie* (Leipsic, 1854, continued in 1856 *et seq.*), and numerous papers in the "Transactions" of the Berlin academy of sciences. Many of the specifications of Ehrenberg have been questioned by other savants, but he has certainly the merit of having first proved the existence of a large class of microscopic plants and animals, and of having opened a new path in which he has now numerous followers.

EHRENBREITSTEIN, a town of Rhenish Prussia, on the right bank of the Rhine, connected by a boat bridge with Coblentz, and called Thal-Ehrenbreitstein, from its situation at the foot of a rocky height which rises 772 feet above the river; pop. about 4,000, including the garrison. On this height stands the celebrated fortress of Ehrenbreitstein, which was probably founded by the Romans under the emperor Julian, was rebuilt in the 12th century by Hermann, archbishop of Treves, and became of great strategetical importance during the 30 years' war. The French under Marshal Boufflers, aided by Vauban, in vain besieged it in 1688. They assailed it again at the end of the following century, but gained possession of it (Jan. 29, 1799) only after a siege of 14 months, and after reducing the garrison to starvation. In 1801 they blew up its defences, but the reconstruction of the fortress has been accomplished by Prussia since 1815. The cost of the works on both sides of the Rhine is estimated at more than $3,500,000. They will lodge 100,000 men, yet a garrison of 5,000 is deemed sufficient to defend them. The magazines are capable of containing provisions for 8,000 men for 10 years. Ehrenbreitstein is defended by about 400 pieces of cannon. The escarped rocks and steep slopes on 3 sides of the fortress seem impregnable. The platform on the top of the rock serves as a parade ground, and covers vast arched cisterns capable of holding a 3 years' supply of water, which is obtained from springs without the walls. The works were executed under the direction of the Prussian general Aster, who died in 1855.

EICHENDORFF, Joseph Karl Benedict, baron, a German author, born near Ratibor, Upper Silesia, March 10, 1788, died at Neisse, Nov. 26, 1857. He was descended from an ancient Catholic Moravian family, was a representative of the so-called romantic school, wrote many fine poems, translated Don Juan Manuel's *Conde Lucanor* (Berlin, 1840) and Calderon's religious plays (2 vols., Stuttgart, 1846–'55) into German, published in 1851 *Der deutsche Roman des* 18. *Jahrhunderts in seinem Verhältnisse zum Christenthum*, and in 1856 *Geschichte der poetischen Literatur Deutschlands*. Four editions of his poetry and of his most popular novel (*Aus dem Leben eines Taugenichts*) appeared in Berlin in the same year.

EICHHORN, Johann Gottfried, a German oriental scholar and historian, born in Dörenzimmern, in the principality of Hohenlohe-Öhringen, Oct. 16, 1752, died in Göttingen, June 25, 1827. Having studied theology at Göttingen, in 1775 he was elected professor of the oriental languages in the university of Jena, and in 1788 was called to the same office in the university of Göttingen, where he taught with brilliant success till near his death. He first proved the extent of his learning in oriental history and literature by treatises upon the commerce of the East Indies prior to the time of Mohammed, and upon the ancient history of the Arabs. At Göttingen he devoted himself especially to biblical criticism, and published the results of his studies in his *Repertorium für biblische und morgenländische Literatur* (18 vols., Leipsic, 1777–'86), and his *Allgemeine Bibliothek der biblischen Literatur* (10 vols., 1787–1801). He was especially influential in founding the interpretation of the Scriptures on a knowledge of biblical antiquity and of oriental modes of thought by his introductions to the Old and New Testaments, and his works on the Hebrew prophets and on the Apocalypse of St. John, beside many valuable papers in periodical works. Near the close of the last century he conceived the plan of a full history of all the branches of intellectual culture in Europe since the revival of letters. To this end he associated himself with several learned writers, and composed the "History of Literature from its Origin to the most Recent Times" (6 vols., Göttingen, 1805–'12), as an introduction to the whole collection. Among his other writings, interesting both from their erudition and style, are his *Urgeschichte* (1790–'93), in which he critically examined the Mosaic records of the creation and fall, and works on the French revolution (1797), on ancient history (6 vols., 1811–'13), and on the history of the last 3 centuries (3d ed., 1817–'18).

EICHSTÄDT, a Bavarian town in the circle of Middle Franconia, on the river Altmühl, about 56 m. from Munich; pop. 6,300. The principality of Eichstädt, of which it was the capital, was dissolved Feb. 28, 1854. Eichstädt had been a bishopric until 1802, when it became a principality, a great part of which was presented in 1817 to Eugène de Beauharnais, duke of Leuchtenberg. A new bishopric, however, was established in 1821, which is suffragan to the archbishopric of Bamberg.

EIDER, a river of Denmark, rising near Kiel in the duchy of Holstein, and flowing into the North sea not far from the town of Tönningen. Its general course is N., and for a considerable distance it forms the boundary between the duchies of Schleswig and Holstein. Its total length is about 105 m., of which 70 are navigable. With the aid of a canal this river forms a means of communication between the North and Baltic seas.

EIDER DUCK (*somateria mollissima*, Linn.), one of the *fuligulinæ* or sea ducks, well known for the remarkable softness of its down and the beauty of its plumage, and common, like other arctic species, to both hemispheres. The bill is elevated at the base, compressed behind the nostrils, divided in front by an acute angle of feath-

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ers, flattened at the tip, which is armed with a strong, broad, and hooked nail; the lamellæ are moderate and far apart; the wings are moderate, pointed, the 1st and 2d quills longest; the tail short and wedge-shaped; tarsi more than half as long as the middle toe; the toes long, united by a full web. The head is very large, the neck short, the body bulky and much depressed; the feet are short, and placed far behind. The plumage is short, dense, soft, and blended. The bill is pale grayish yellow, iris brown, feet dingy light green with dusky webs; upper part of head bluish black, with the central part white; occiput, upper part of hind neck, and sides of neck delicate pale green; sides of head, throat, and neck white; lower neck and upper breast cream-colored or buff; rest of lower surface black, as are the tail coverts and middle of the rump; rest of upper parts white, the scapulars tinged with yellow, except the secondaries which are brownish black, and the primaries grayish brown; the length is 25 inches, the extent of wings 42, the tail 4½, bill 2⅝ inches; the weight is from 4½ to 5½ lbs., greatest in winter. The female differs greatly from the male, having the general plumage brown barred with black, lighter on the head and neck; secondaries and their coverts with white tips; the size is also somewhat smaller; the young in the first winter resemble the female. The eider is rarely seen south of New York; east of Boston it is more and more abundant as the latitude increases. Thousands of pairs breed and pass the summer in Labrador, where they are called sea ducks, a name also given to other species; they there begin to make their nests about the last of May, amid the grass and low bushes, and in sheltered places among the rocks; many nests are found near together, made of sea-weed, moss, and twigs, each containing from 5 to 7 eggs, about 3 inches long, of a pale olive-green color; the eggs are considered great delicacies by the fishermen. When the eggs are laid, the female plucks the down from her breast, and places it under and around them, and when incubation commences the male leaves her to take care of her eggs and herself; when she quits the nest in search of food, she pulls the down over the eggs to keep them warm; when hatched, she leads the young to the water, or carries them thither in her bill, teaches them to dive for food, and protects them from their worst enemies, the black-backed gulls; by the 1st of August old and young are moving southward. In many places the birds are not allowed quietly to hatch their eggs; the nests are robbed by man of both down and eggs, when the female seeks another male, and lays a second time with the usual quantity of down; if again disturbed, she will try a third time, the down being supplied from the breast of the male. The unnecessary destruction of the birds by the eggers of Labrador has nearly destroyed the trade, and driven them further north. The down of a nest, though bulky enough to fill a hat, when cleared of grass and twigs rarely weighs more than an ounce, though an instance has been related in which the quantity obtained the first time from a single nest is said to have weighed ½ lb.; when properly cleaned, it is worth from 12*s.* to 14*s.* per lb. for the English market. So highly is it prized for warmth and lightness, that in Iceland and Norway the districts resorted to by the duck are regarded as valuable property, and are strictly preserved. The Icelanders take pains to make artificial islands by cutting off projecting points from the mainland, such spots being more attractive to the birds from their seclusion than the mainland itself. Eiders fly rapidly, steadily, and generally near the water, rarely more than a mile from the shore; they are very expert divers, descending several fathoms, and remaining long under water; the food consists of crustacea, mollusks, and the roe of fishes; the gizzard is large and muscular; they are rarely seen inland, unless driven in by storms. They are shy, and difficult to kill; the flesh of the young and females is said to be well flavored, but that of the males is tough and fishy, and rarely eaten except by hungry fishermen. The common eider has been reared in captivity, becoming as gentle and tame as the domestic duck, with which it readily associates; from its eminently social disposition, it would doubtless be a valuable acquisition in a domesticated state, for its feathers and down, for its eggs, and even for its flesh.—The king eider (*S. spectabilis*, Linn.) is a handsomer bird than the preceding, and like it is an inhabitant of the higher latitudes of both continents. The bill of the male is yellowish, the upper mandible having at the base a soft, compressed, orange-colored substance, extending upon the forehead; the front is covered with short black feathers; the general shape is like that of the common eider, and the character of the plumage the same. The iris is bright yellow, feet dull orange with the webs dusky; the head is bluish gray, darkest behind; the sides of the head pale bluish green; a black spot below the eye, and 2 lines of the same color on the throat; fore neck cream-colored; the sides and posterior part, with a patch on the wings, and one on each side of the rump, white; lower plumage blackish brown; posterior part of back, scapulars, larger wing coverts, and secondaries brownish black, the latter with a greenish gloss; primaries and tail blackish brown; the size is about that of the other species. The female is quite different, having the head grayish yellow, with small brownish black lines, the scapulars with brownish red margins, the general color of the lower parts pale yellowish brown, and the quills and tail deep grayish brown; the feathers of the lower neck, breast, sides, and lower tail coverts with a centre and margin of brownish black. The king eider is not often seen in the United States, breeding further north than the common eider; its habits resemble those of the latter species; its home is the sea, the land being visited only in the breeding season; its down is valuable; the eggs are about 2⅝ inches long, of a dull greenish color.

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EILDON HILLS, a group of hills in the co. of Roxburgh, Scotland, consisting of 3 conical peaks, the highest of which has an elevation of about 1,350 feet. From their summits a magnificent view of the romantic border scenery of Scotland may be obtained. There is a tradition among the peasants of the neighboring country that these hills were originally one mountain, which was divided into 3 separate summits by a demon under the wizard Michael Scott.

EIMBECK, a town of Hanover, capital of the principality of Grubenhagen, 21 m. N. N. W. from Göttingen, on the Ilme; pop. 6,500. It has manufactories of woollens and linens, and several tanneries and bleacheries. Its importance has declined since its walls were destroyed by the French in 1761, but prior to that it was prominent among the military towns of the empire. It early embraced the reformation. Its beer was so celebrated that it was said that the affairs of Germany were settled by the princes over foaming draughts of it. The church containing the mausoleum of the dukes of Grubenhagen, and the castle of Rothenkirchen in the vicinity, are its finest edifices.

EINSIEDELN, or EINSIEDLEN, a village of Switzerland, in the canton of Schwytz, on the Sihl; pop. 6,850. It is situated 9 m. N. N. E. of the town of Schwytz, and about 3,000 feet above the level of the sea. Adjoining the village is a famous Benedictine abbey whence it derives its name. This abbey was originally founded in the 10th century, but has been since several times rebuilt. The present edifice, which dates from 1719, is in the modern Italian style, and contains a museum, a library of 26,000 volumes, and a marble chapel wherein is an image of the Virgin that attracts thither multitudes of devout Roman Catholics from many parts of Europe. The village has more than 70 inns and restaurants for their accommodation. Zwingli was once parish priest of this place.

EISENACH, a principality in the centre of Germany, formerly independent, but since 1741 united to the grand duchy of Saxe-Weimar; area, 465 sq. m.; pop. 80,600. It is bounded N. by Prussian Saxony, E. by Saxe-Gotha and Saxe-Meiningen, S. by Bavaria, and W. by Hesse-Cassel, and contains 7 cities, 8 boroughs, and 130 villages. It is traversed irregularly by mountain ranges covered with forests, and watered by the rivers Werra, Hörsel, Nesse, Ulster, and Felde. Its products are grain, flax, timber, horned cattle, sheep, copper, iron, and alum. There are also quarries of marble, important salt springs, and manufactures especially in the town of Eisenach and the village of Ruhla.—EISENACH, the capital of the above principality, is situated on the border of the Thuringian forest, at the confluence of the Hörsel with the Nesse, 712 feet above the sea level, 45 m. W. of Weimar, and is the chief station of the Thuringian-Saxon railway; pop. 9,980. It is enclosed by a wall, has broad streets generally paved with basalt, and several remarkable public buildings, among which is the castle, formerly the residence of the princes of Eisenach. Its manufactures are chiefly woollen and cotton fabrics, and pipe heads of soap stone. In its environs on a lofty height is the ancient castle of Wartburg, once the residence of the landgraves of Thuringia, celebrated as the place where the Minnesingers contended for the palm of poetry, and as the asylum where Luther composed his translation of the Bible. It was in the streets of Eisenach that Luther, when 17 years of age, and a poor student, sang before the houses of the rich to gain his bread. The conferences of the German Evangelical church have been held in Eisenach since 1852, and the 12th conference of the *Zollvereein* was held there in 1856.

EISLEBEN, a town of Prussian Saxony, 27 m. N. W. from Merseburg; pop. 10,800. It is noted as the place where Martin Luther was born and died. The house in which he was born no longer remains, having been burned in 1689, but that in which he died is still preserved, and has recently been converted into a school for poor children. In an upper story of the house several relics of Luther are kept, among which is the album of his friend the painter Cranach, who made the designs for his works. In the church of St. Andrew, the pulpit from which Luther preached but a few days before his death is still preserved. There are copper mines in the vicinity of the town.

EISTEDDFOD, the name of an assembly of the bards and minstrels of Wales, in the town of Caerwys in Flintshire, for the purpose of musical and poetical contests. After long disuse, they are now held at regular intervals.

EJECTMENT (Lat. *ejectio firmæ*; Fr. *éjectement de firme*), an action for the recovery of the possession of lands, but now used both in England and the United States for the trial of title. The peculiarity of this action has been referred to in the article DISSEISIN. As it retains scarcely any thing of its original form and uses, the history of the action is matter rather of curious learning than of practical importance. Yet it is well worthy of study as perhaps the most remarkable precedent of the adaptation of form to new exigencies to be found in the English law. A lucid exposition of the origin and gradual modification of the action will be found in Blackstone's "Commentaries," vol. iii. pp. 199–205.

EKATERINBURG, IEKATERINBOURG, or YEKATERINBOORG, literally Catharine's castle, the capital of the Russian mining district of the Ural, in the government of Perm, situated about 50 m. from the European frontier, on the Asiatic side of the Ural mountains; lat. 56° 50′ 14″ N., long. 60° 34′ 44″ E.; pop. in 1851, 15,528. Ekaterinburg is built on each side of the river Iset. On the S. E. side is an extensive plain, upon which are the government buildings connected with the working of the precious metals and gems, as also a public square or market place. On the opposite side are spacious streets and elegant houses of the merchants and mine proprie-

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tors. Some of these are upon the summits of hills, and those upon the north side of the town overlook a beautiful lake, which extends several miles in a westerly direction until hid in the Isetskoi woods. From the lake is a fine view of the towers, spires, and domes of the 8 churches, the monastery and the convent seen above the numerous other public and private buildings; while overtopping and behind all is a rocky mount clothed with dark green foliage, upon the summit of which is the observatory used for magnetic and other scientific observations. The numerous costly edifices are mostly built of brick and covered with cement. Some private houses are described as well built and beautifully decorated, and furnished with much luxury and comfort. The town owes its importance to the numerous rich mines in its vicinity. The mineral productions are gold, copper, iron, platinum, and precious stones. The iron mines near here are of vast extent and importance, and some of their products, in the form of sheet iron, find their way even to the United States. Platinum is found in considerable quantities, and this is the most important region on the globe for the production of this metal. Among the precious stones worked at the great lapidary establishments of Ekaterinburg are noted particularly the jaspers, malachites, topaz, emeralds, beryls, chrysoberyls, aquamarine, tourmalines of different colors, amethysts, &c., some of which are brought great distances from eastern Siberia. The jaspers, malachites, and porphyries also, are made into tables of great magnificence and immense value, some inlaid with stones of different colors in imitation of birds, flowers, and foliage. The jasper vases ornamented with delicate carvings of foliage are described as objects of great beauty, executed with extraordinary skill and taste by workmen whose wages are somewhat less than a dollar per month, with 2 *poods* (72 lbs.) of rye flour. Meat they are supposed never to eat. At the great establishment called the Granilnoi Fabric, which belongs to the Russian government, this work is extensively prosecuted, and the columns, pedestals, tables, vases, and numerous smaller articles, are said to be unrivalled in workmanship, either in ancient or modern times. All the precious stones found in Siberia are the property of the czar, and the most valuable of these are sent to the imperial palace at St. Petersburg. The government also owns different iron works in this region, in which are constructed heavy guns and other munitions of war. The chief of the Ural, or principal officer of the mining direction, appointed by the government, is a general of artillery; and another general of artillery is appointed by the minister of war to reside at Ekaterinburg, with especial charge to inspect and supervise the construction of all the guns made in the mining districts of the Ural. At Ekaterinburg are machine shops of great extent belonging to the government, in which the machinery is made for the mint and other public works, the iron employed being of the highly prized qualities so well known on this side of the Atlantic, as obtained from the Ural mines and furnaces. Machine works have also been established at Ekaterinburg within a few years past by private individuals; also an extensive manufactory of stearine. (See Atkinson's "Siberia." London, 1858.)

EKATERINOSLAV, Ekaterinoslav, or Yekaterinoslav, a government of European Russia, between lat. 47° and 49° 20′ N., and long. 33° 30′ and 39° 40′ E., bounded E. by the territory of the Don Cossacks, S. by the sea of Azof and Taurida, W. by the government of Cherson, and N. by those of Pultowa and Kharkov, and comprising also the district of Taganrog and the territory of the Azovian Cossacks, separated from the rest of the government by the country of the Don Cossacks; area, 25,523 sq. m.; pop. in 1851, 902,369. The Dnieper intersects and divides it into 2 unequal portions. The larger of these divisions, situated E. of that river, is mostly an open steppe, destitute of timber, and adapted only to pasturage; but the smaller, or W. section, is fertile and undulating. The climate is mild and healthful. The principal vegetable productions are wheat, barley, oats, hemp, flax, and fruit. The chief wealth of the inhabitants, however, consists of horses, horned cattle, sheep, and swine. The rivers abound in fish. The most valuable minerals are granite, limestone, chalk, and salt. There is little manufacturing industry, but a great many distilleries, where large quantities of brandy are made. The population consists chiefly of Russians and Cossacks, but Servians, Wallachians, Greeks, Tartars, Turks, Persians, and German colonists are also found. The houses of the poorer classes are generally constructed of clay and thatched with rushes. The government is divided into 7 circles.—Ekaterinoslav, the capital of the government, is on the right bank of the Dnieper; pop. about 13,000. This town was founded in 1784. The streets are broad and regular. The principal edifices are the churches, gymnasium, ecclesiastical seminary, hospitals, law courts, public offices, barracks, and bazaars. There are manufactories of cloth and silk stockings, and a large annual wool fair. It is the seat of an archbishop.

EKRON, the most northern and important of the 5 royal Philistine cities, assigned in the distribution of territory to Judah. The ark was taken to Ekron after its capture by the Philistines. Beelzebub was called the god of Ekron, and was here worshipped, and the prophets made this city the burden of some of their most violent denunciations. It is supposed by Dr. Robinson that the modern Moslem village of Akir, 5 m. S. of Ramleh, occupies the site of the ancient Ekron.

EL, or Al, the Arabic definite article, often making one word with the noun which follows it; thus, *Alkoran*, the Koran. Its other forms are *il*, *ul*, and *ol*. Many words in English and other European languages beginning with *el* or *al* are from the Arabic, as *almanac*, *alcohol*

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EL DORADO. Orellana, the lieutenant of Pizarro, being sent on an expedition from the sources of the Amazon to its mouth, pretended to have discovered in the interior of the continent, between this river and the Orinoco, a country surpassing even Peru in the abundance of its precious minerals and metals. To this he gave the name of El Dorado, the golden region, and to its capital the name of Manoa. For a long time afterward this fabulous region grew more and more famous from the exaggerated accounts that were published, and from the explorations that were undertaken in search of it, and it was not until the commencement of the last century that its existence was generally discredited. Even as late as 1780 a large party of Spaniards were lost in one of these expeditions. The word, except as now applied from the love of hyperbole to several villages in the western states, and to a county in California, is only used poetically to express a region overflowing with riches.

EL DORADO, a N. E. co. of California, bounded E. by Utah, and N. by American river, by the S. fork of which, and by Carson's and Walker's rivers, it is also drained; area, 2,050 sq. m.; pop. in 1856 estimated at 55,980. It is crossed by the Sierra Nevada. In 1856 it produced 17,280 bushels of wheat, 27,600 of barley, 26,400 of oats, 300 of potatoes, and 1,628 tons of hay. Not more than 5,000 acres were under cultivation, over $\frac{1}{4}$ of the county consisting of mineral land, which is among the most valuable in the state, and on which, beside gold, are found rich copper ore and excellent marble. In 1856 there were 17 quartz mills in operation, 44 saw mills, 1 grist mill, 10 brick kilns, 3 tanneries, and 6 breweries. Capital, Placerville.

EL PASO, a N. W. co. of Texas, bounded N. by New Mexico, and W. by the Rio Grande; area, 10,300 sq. m.; pop. in 1858, 3,078, all of whom were returned as free whites. The surface is mountainous, and about $\frac{1}{5}$ is covered with timber. The soil of the valleys is rich and suitable for wheat and Indian corn. Coal is found in abundance. Value of real estate in 1857, $103,140. Formed from Bexar co. in 1850. Capital, El Paso.

EL PASO, or El Paso del Norte, a line of settlements in the N. E. corner of Chihuahua, Mexico, opposite the town of Franklin in Texas. They are situated in a narrow valley extending 9 or 10 m. along the right bank of the Rio Grande, which is here from 300 to 600 feet wide. The soil of the valley is remarkably rich, and suitable for oats, wheat, and maize; the grape also grows here in great perfection. The chief manufactures of the place are a species of weak wine and brandy, called by American traders "Pass wine" and "Pass whiskey." The inhabitants of these settlements are usually of mixed races, few of them being free from a tinge of Indian blood. They are not without wealth, but never use the means at their command to supply themselves with articles of comfort or luxury which in most civilized communities are deemed indispensable. Glazed windows, for example, are unknown; knives and forks are not used; and even the houses of the rich contain neither chairs nor tables. Their dwellings are built of sun-dried bricks, with earthen floors, and are usually but one story high. The parish church, the plaza, and the more pretentious of the private residences, are situated in the northern part of the valley, just below a gorge or pass in the mountains. This portion of the settlement is probably best entitled to be called the town of El Paso. It is about 350 m. S. by W. from Santa Fé, 600 m. in a direct line E. from the Pacific, and 1,800 m. from Washington; lat. 31° 42′ N., long. 106° 40′ W.; pop. about 5,000. It is the principal thoroughfare between New Mexico, Chihuahua, and the Mexican states further south, and is an important station on the southern overland route to California. Its name, signifying "the pass," is probably derived from the passage of the Rio Grande through the mountains.

ELAGABALUS, Varius Avitus Bassianus, a Roman emperor, son of the senator Varius Marcellus and Julia Sœmias, and cousin of Caracalla, born at Emesa, in Syria, about A. D. 205, died in Rome in 222. He has been called the Sardanapalus of Rome. While yet a boy he was made priest of Elagabalus, the Phœnician sun god, in his native city; and the Roman soldiers who used to resort to the magnificent ceremonies of the temple there, beholding the elegant dress and figure of the young pontiff, thought they recognized in him the features of Caracalla. His artful grandmother was willing to advance his fortune at the expense of her daughter's reputation, and spread a report that he was the offspring of an intrigue between her and the murdered emperor. The army, disgusted with the parsimony and rigid discipline of Macrinus, was disposed to admit his pretensions. Elagabalus, as he was called from his sacred profession, took the name of Antoninus, was received with enthusiasm by the troops of Emesa, and declared emperor under the name of Marcus Aurelius Antoninus (218). Macrinus sent detachments of his army from Antioch to crush the rebellion, but the legions murdered their commanders and joined the enemy. At length he himself marched forth to meet the pretender, and his prætorian guards broke the rebel ranks. But Elagabalus, for the only time in his life recklessly heroic, charging at the head of his best troops, renewed the battle with such vigor that Macrinus fled, and the prætorians surrendered. Macrinus was soon after captured and put to death, and the Roman senate recognized the victorious boy as emperor. He began his march from Syria to Italy, spent a winter at Nicomedia, and in the next summer made his entry into the capital in all the state of an oriental monarch. He quickly displayed not less the despotic humor of a passionate old man than the fantastic caprices of a spoiled child. His elevation he thought to be due to the power of the sun, which he worshipped in the form of a black conical

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stone, and the senators of Rome were obliged to see their hills covered with altars and their streets filled with processions in honor of the god of Emesa. Mount Palatine became the seat of a magnificent temple, where lascivious dances were performed by Syrian damsels. The Quirinal was occupied by a senate of women, who gravely discussed matters of toilet and ceremonial. In a mystical fancy about the sun and moon, he married the Carthaginian priestess of the moon, which was adored in Africa under the name of Astarte. He abandoned himself to the wildest pleasures, but neither a rapid succession of wives, nor a long train of concubines, nor the art of his cooks, could satisfy his passions, or save him from satiety. Wearied at length with playing the part of a man, he declared publicly that he was a woman, wished to be dressed like the empress, chose a husband, and worked upon lace. His cruelties were as great and as fantastic as his follies. Having at one time invited the patricians of Rome to a dinner, in the midst of the repast he opened the doors and let in upon them several furious tigers and bears. The patience of the populace and soldiers being exhausted by his vices and tyranny, a sedition was about to break out, when Elagabalus was induced to adopt as his colleague his cousin Alexander Severus. Alexander cherished the rigid manners and primitive usages of Rome, and quickly became the favorite of the army. When Elagabalus sought to withdraw from him the power which he had granted, or even to compass his death, the prætorians broke out in mutiny and killed the emperor and his mother, and threw their bodies into the Tiber.

ELAND, a name applied by the colonists of the cape of Good Hope to the impoofo (*boselaphus oreas*, H. Smith), an antelopean ruminant, resembling the bovine group in stature, shape, dewlap, and high shoulders. The general color above is a grayish yellow, with rusty and purplish shades shining through it; the lower parts cream yellow; the forehead with long, stiff, yellowish brown hairs; face brownish red, chin white, eyes chestnut; a slight brownish yellow mane, along the back becoming reddish brown; muzzle black; hoofs brownish black, edged above with brownish red hair; the tail is brownish red, with a tuft of yellowish brown; the mane of the dewlap is yellowish brown, pencilled with brownish red. This is the color of the male, which has a small head, a neck tapering above, but bulky toward the chest; the body is thick and heavy; the limbs elegant and slender; the eyes are full and soft, and the expression of the face is gentle and ovine; the horns slope slightly back from the crown, being very thick at the base, with 2 spiral turns having an obtuse ridge, and the upper ⅓ straight, tapering to a point; the ears are long, narrow, and pointed, hairy on both sides; the hair is rather thin, except on the neck, mane, dewlap, and tuft of tail. The length from nose to base of tail is about 10½ feet, the head being 17 inches; the horns are nearly 3 feet long; the height at the shoulder is 5¾ feet, and at the crupper 2 inches less; the length of the tail 2½ feet, and of the dewlap at its base 20 inches. The female is of a pale sienna yellow, deadened with pale brown above; below dirty white, with a cream-yellow tinge; the figure is more delicate and elegant than that of the male, the limbs are more slender, the mane is shorter, the dewlap narrower, the tail less tufted; and the horns are straight, slender, somewhat spiral at the base, with a rudimentary ridge on the spire. The young are of a tint between reddish orange and yellowish brown. This is probably the largest of the antelopes, equalling the horse in height, and weighing from 7 to 10 cwt. It ranges the borders of the great Kalahari desert in herds varying from 10 to 100; rare at present within the limits of Cape Colony, it was found in abundance in the wooded districts of the interior by R. Gordon Cumming. The flesh is most excellent, and is greatly esteemed. When young and not over-fed the eland is not easily overtaken by the cape horses; but in good pastures it grows so fat that it is easily run down; it is said that when pursued it invariably, if it can do so, runs against the wind, which gives it an advantage in outrunning a horse. The hide is very tough, and much prized for shoes and traces. Like other antelopes, it seems to be independent of water, frequenting the most desert localities far from streams and rivers; except in the breeding season and when pursued, the males generally keep in groups apart from the females. Another species of the genus *boselaphus* is the *B. canna* (H. Smith), called bastard eland by the colonists to distinguish it from the preceding species; it is smaller than the eland, of a dark brownish gray color, with a white space between the fore legs. The name of eland, or elk, is improperly applied to this as well as to several other deer and antelopes, by the Dutch colonists of Africa and the Indian archipelago, and apparently indiscriminately to any hollow-horned ruminant of large size; the animal called eland by recent travellers and hunters in south Africa is in most cases the first described species, and probably sometimes the second, as both are found in the same districts, though the herds do not intermingle. These animals are gentle and readily domesticated; but though strong, the shoulders do not possess that solidity which renders common domesticated cattle so valuable to the agriculturist. The late earl of Derby in 1842 received at his extensive menagerie at Knowsley Hall 2 males and a female eland, the first brought alive to Europe; the female produced several calves, but the whole stock died from improper pasturage except one female born in 1846. In 1851 a fresh supply was received from the cape of Good Hope, which he bequeathed the same year to the zoological society. This herd, 2 males and 3 females, rapidly increased, and several were distributed by sale to different parts of England, whose uncultivated lands re-

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semble the park-like country of the African home of the animal. Lord Hill, of Hawkstone, Shropshire, first attempted their naturalization in his extensive park, and on Jan. 7, 1859, killed the first eland for the table which had been bred in England; the animal, 5 years old, weighed when he fell 1,176 lbs., "huge as a short-horn, but with bone not half the size." Choice parts of the animal were served at the tables of Queen Victoria and the French emperor, and before Prof. Owen and members of the zoological society; it was found to resemble beef, with a venison flavor, with a fineness of fibre and a delicacy of fat placing it high on the list of choice and nutritious articles of food. It seems probable that this animal will be extensively raised in England, and add an important item to the national bill of fare. It is much to be regretted that we have no place in the United States where similar experiments in introducing new animals may be prosecuted on a large scale.

ELASTIC CURVE, the curve assumed by a straight spring of uniform thickness when the ends are brought forcibly together. It embraces a variety of appearances, simple waves, overlapping waves, a figure of eight, retrograde loops or kinks, ordinary loops, and the circle. The fundamental law or equation of the curve is that the curvature of each point is directly proportional to its distance from a certain straight line on which the curvature is zero; so that when the curve crosses this line it reverses the direction of its curvature.

ELASTICITY (Gr. ἐλαύνω, to drive, to draw). When by the application of an external force the particles of a body are disturbed from the state of equilibrium in which they were held, and a change of form is thereby induced in the body, the tendency of the particles to regain their former state and restore the original form is termed elasticity. The force is more nearly perfect according as the time required to regain the primitive form, after the cessation of the disturbing force, approaches that expended in producing the change. The air and gases exhibit the property more perfectly than any other substances; but no bodies are altogether deficient in it. A ball of glass, ivory, steel, or other hard material, let fall upon a smooth hard surface, rebounds from the tendency of the particles to return to the position among themselves from which they have been forced by the blow. If the hard surface be covered with a thin coating of some viscid substance, or of oil, the impression left upon this indicates a flattening of the ball, and this is found to be greater according to the height of the fall. Fluids formerly thought to be incompressible, and consequently inelastic, have been proved by the experiments of Oersted to be compressible in proportion to the force exerted, and when relieved of pressure they returned immediately to their former bulk; hence they may be regarded as fulfilling the requirements of perfect elasticity, though only to a very slight extent. The elasticity of the soft metal lead is shown by the tendency of a long wire made of it, when suspended at one end and twisted, to uncoil itself and return to its former position. A thread of clay, made by forcing the soft substance through a small hole, manifests the same property. In these and many other instances the force exerted by the particles to regain their former position of equilibrium carries them back to this point, and the force not being expended the motion is continued in the same direction till the resistance becomes too great, and thus the particles are drawn alternately in one and the other direction with constantly diminishing force, producing a series of vibrations; thus musical sounds are produced, the pitch depending upon the greater or less rapidity of the vibrations. By the application of too great force, or by too great strain, the particles of a solid body may be displaced and find their equilibrium in a new arrangement. This may occur with a visible separation of the particles, as in a breaking apart of the body; or it may be made apparent by the manifest indisposition of the body to change from its new state. A wire or metallic bar thus bent beyond its limit of elasticity is said to have "taken a set." The amount of elasticity in bodies, or the force they will resist without permanent alteration of structure, may be expressed by the number of pounds weight to the square inch they will bear without being crushed, or, as proposed by Dr. Thomas Young, "by the weight of a certain column of the same substance, which may be denominated the *modulus* of its elasticity, and of which the weight is such that any addition to it would increase it in the same proportion as the weight added would shorten by its pressure a portion of the substance of equal diameter. . . . The height of the modulus is the same for the same substance, whatever its breadth and thickness may be; for atmospheric air it is about 5 miles, and for steel nearly 1,500." This modulus or coefficient of elasticity has been determined by experiment for a considerable number of substances. It is an important element in the physical properties of bodies, and must be duly considered in investigating the strength of materials, the sciences of hydrodynamics, pneumatics, &c.

ELATERIUM (Gr. ἐλαύνω, to drive), a drastic purgative medicine, prepared from the juice of the *momordica elaterium*, or the wild or squirting cucumber. Hippocrates applied the name generally to any active purge. It is uncertain whether the name was given to the plant from the curious property belonging to the fruit of separating when ripe from the vine and discharging its juice and seeds through an opening at the base, where it was attached to the foot stalk, or from the action of the medicine prepared from it upon the bowels. This medicine is a very light, pulverulent, and pale yellowish green sediment deposited from the juice. The quantity is very small, only 6 grains being obtained by Clutterbuck from 40 cucumbers. A dose of ½ of a grain of the genuine article,

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however, purges violently; larger quantities excite nausea and vomiting. In dropsy it is highly recommended from its tendency to produce copious liquid discharges. The plant is largely cultivated in the south of Europe and in some parts of England. The stem has been seen 4 inches wide, with a thickness of only half an inch. When the fruit separates from the stem, the juice is said to be thrown sometimes a distance of 20 yards. One incurs some risk of injury to the eyes in walking among the vines at the season of maturity of the fruit. The juice thus naturally expelled is inferior in quality to that afterward expressed from the fruit. From a bushel weighing about 40 lbs., and worth from 7*s.* to 10*s.* sterling, about half an ounce of the medicine is obtained; but if the expression is carried too far, the product is of inferior quality.—See article by Mr. Jacob Bell in "Pharmaceutical Journal and Transactions," Oct. 1850.

ELATH (in Josephus *Ailane*, in Roman geography *Elane*, now *Ailah*), a seaport of Idumea, of great celebrity, lying on the shore of the eastern or Elanitic gulf of the Red sea, now called the gulf of Akabah. It was a part of David's conquest from the Edomites; was a place of great importance in Solomon's time, as the port in which he built and fitted out his ships for importing gold from Ophir; was captured by the revolted Edomites in the reign of Joram, after having been in the possession of the Israelites 150 years; was retaken by Uzziah, who fortified it anew, peopled it with his own subjects, and restored the trade to Ophir; was afterward taken by Resin, king of Damascus, who in his turn was deprived of it by Tiglath-Pileser, king of Assyria, from whose time it was never recovered by the Jews. Elath adjoined Ezion-Geber; and Akabah now occupies the site of one or both of these ancient towns.

ELBA, the Ilva of the Romans and the Æthalia of the Greeks, an island in the Mediterranean, belonging to Tuscany, from the coast of which it is separated by the strait of Piombino; length about 18 m., and greatest breadth 12 m.; area, about 97 sq. m.; pop. in 1858, 22,026. Its outline is irregular, the mountains which traverse the island rising in some parts to a height of above 3,000 feet, and being indented by deep gulfs and inlets, so that its breadth in some places does not exceed 3 m. The soil is fertile, but only a small portion of it is under tillage. The valleys abound with fruit trees, but they are not well cultivated, and the fruits are of inferior quality, excepting oranges. Among the annual products of the island and its waters are about 1,700,000 gallons of red and white wine, 4,000,000 lbs. of marine salt, 5,000 to 6,000 tons of tunnies, sardines, anchovies, and other fish, and 18,000 tons of minerals, chiefly iron, for which the island has always been celebrated. The iron is found in a mountain near Rio, on the E. coast, about 2 m. in circumference, 500 feet high, and yielding from 50 to 75 per cent. pure metal. About 300 persons are employed in the mines. The quarries of granite in the S. W. part of the island appear also to have been extensively worked by the Romans. The commercial relations of the island are almost confined to Leghorn and Marseilles. The imports consist chiefly of grain, cattle, cheese, and manufactured articles, and the exports of the above named and a few other articles. Ancient ruins are still visible in various parts of the island. During the middle ages it was ruled by various Italian princes and chiefs. In 1548 Charles V. ceded the territory of Porto Ferrajo to Tuscany. Afterward the island was successively governed by Spain, Naples, and the lords of Piombino. From July, 1796, to April, 1797, it was in the possession of the British. It was then ceded to France, and united with the new kingdom of Etruria. The treaty of Paris in 1814 erected Elba into a sovereignty for Napoleon I., who resided there from May 4, 1814, to Feb. 26, 1815, when he embarked from the island with about 1,000 men for France, landing at Cannes, and marching triumphantly to Paris. During his brief sovereignty Napoleon introduced many improvements, and caused a good road to be built uniting Porto Carrajo with Porto Longone, a small fortress and harbor on the E. coast. In 1815 Elba reverted to the grand duke of Tuscany, and its affairs are now administered by a civil and military governor (in 1859 Col. Edoardo Facdonelle), who resides in Porto Ferrajo.

ELBE (anc. *Albis*), a large and commercially important river of Germany, rising in the Riesengebirge of Bohemia, near the frontier of Prussian Silesia, and passing into the North sea between Holstein and Hanover, through Austria, Saxony, Prussia, Anhalt-Dessau, Hanover, Mecklenburg, and Hamburg. It is about 650 m. long; is known at its source as the Labe; originates in a number of springs on the western slope of the Schnee-Koppe (snow summit), one of the peaks of the Riesengebirge; runs mainly in a N. W. course; is navigable from its confluence with the Moldau, and has but a very slight inclination, its bed, 40 m. from its sources, being but 658 feet above the sea. Its chief affluents are: on the right, the Iser, Black Elster, Havel, and Spree; on the left, the Moldau, Eger, Mulde, Saale, Ohre, Jetze, Ilmenau, and Oste. Josephstadt, Königgrätz, Leitmeritz, in Bohemia; Pirna, Dresden, Meissen, in Saxony; Torgau, Wittenberg, Magdeburg, in Prussia; Lauenburg, Hamburg, and Altona, are the chief places situated upon its banks. Its channel, between Hamburg and the sea, will admit of the passage of vessels drawing 14 feet water, at all times, but is much encumbered with sand bars and shoals. By means of its own waters and those of the numerous canals branching from it, the Elbe places all N. W. and central Germany in connection with the seaboard. Wood, stones, fruits, and earthenware are the chief articles of export, which are exchanged for corn, salt, and colonial produce. Its navigation was in former times much com-

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plicated by the regulations of the states through which it runs. Since 1821 these have been simplified, and the entire river is now open to vessels of all the adjacent countries. Austria relinquished the Bohemian Elbe dues in 1852. In 1855 Hanover abolished the Elbe dues levied at Stade for all ships and goods entering Harburg seaward, and various conferences have since been held for the purpose of bringing about a total abolition of the dues. The Hanoverian chamber in 1858 voted a grant of money for the improvement of the navigation. There are steamboats on the Elbe between Magdeburg and Hamburg, and between Dresden and the source of the river in Bohemia.

ELBERFELD, an important manufacturing town of Rhenish Prussia, adjoining Barmen, 15 m. E. from Düsseldorf, and connected by railway with that and most other Prussian towns; pop. in 1855, 41,080. The river Wupper, which flows through the town, presents advantages for bleaching. Linen bleacheries were in operation here as early as the 16th century. Manufactories of linen, woollen, cotton, silks, lace, ribbons, &c., were gradually established, and have since the 18th century attained to a high degree of perfection. The dyeing of Turkey red, which was first attempted in 1780, is another prominent pursuit at Elberfeld. Large quantities of yarn are annually sent here from Great Britain and other countries to be dyed. The annual value of the goods manufactured in Elberfeld exceeds $11,000,000. The Rhenish East India company and a company for working mines in Mexico had their seat here for a number of years. Elberfeld is rich in charitable and educational institutions, among which are a gymnasium, an industrial school, and a school in which the higher branches of weaving are taught.

ELBERT, a N. E. co. of Ga., separated from S. Carolina by Savannah river, bounded S. and W. by Broad river, and drained by several small creeks; area, 514 sq. m.; pop. in 1852, 13,158, of whom 6,446 were slaves. The surface is hilly, and the soil, particularly near the rivers, is fertile. The productions in 1850 were 614,066 bushels of Indian corn, 65,183 of oats, 64,777 of sweet potatoes, and 8,565 bales of cotton. There were a number of mills and factories, 20 churches, and 1,202 pupils attending public schools. Near the Savannah river are several remarkable artificial mounds, one of which is 40 or 50 feet high and has a large cedar growing on its summit. The county was named in honor of Samuel Elbert, formerly governor of the state. Value of real estate in 1856, $1,506,244. Capital, Elberton.

ELBERT, Samuel, an American officer of the revolution, born in South Carolina in 1743, died in Savannah, Ga., Nov. 2, 1788. He was engaged in commercial pursuits in Savannah, where he became a member of the general committee of safety, and in Feb. 1776, received a commission as lieutenant-colonel from the assembly of Georgia. He was promoted to the rank of colonel in the same year; led an unsuccessful expedition against the British in East Florida in the summer and autumn of 1777; was actively engaged near Savannah, and captured Oglethorpe's fort at Frederica, in 1778; and distinguished himself during Campbell's attack upon Savannah in Dec. 1778. He commanded a brigade at the battle of Brier Creek, where he was taken prisoner, March 3, 1779; and after being exchanged he went to the north, joined the forces under Washington, and took part in the battle of Yorktown. At the close of the war he received the commission of major-general, and in 1785 he was elected governor of Georgia.

ELBEUF, or Elbœuf, a French town, in the department of Seine-Inférieure, on the left bank of the Seine, 4 m. distant from the Tourville station of the Paris and Rouen railway; distance from Paris 78 m., and from Rouen 13 m.; pop. about 19,000, exclusive of about 12,000 workmen from adjoining villages employed in the factories. Almost from the foundation of the town in the 9th century the inhabitants displayed great skill and industry in the manufacture first of tapestry and afterward of woollen cloth. Colbert's enactments in 1667 promoted the prosperity of the town, which was interrupted, however, by the revocation of the edict of Nantes, when many of the manufacturers emigrated and settled in Leyden, Norwich, and Leicester. The industry of the place did not fully recover from this shock and from the competition of Belgium until 1815. The annual products, which then amounted only to about 25,000 pieces (of 60 yards each), comprised in 1858 about 70,000 pieces. There are 200 factories, mostly worked by steam power, 25 dyeing establishments, and 10 depots of wool, of which about 6,000,000 lbs. are annually required. The annual aggregate value of the total production is estimated at $10,000,000. The description of goods produced includes double-twilled and water-proof cloths, zephyrs, fancy cloths, billiard table cloth, and flannel. Nearly 40 establishments received medals at the Paris industrial exhibition of 1855. There are 2 annual fairs, deriving importance from the sale of cloth, the extensive trade in wool, and also in cattle, chinaware, and hosiery. Elbeuf contains 2 Gothic churches, courts of law, and various schools and charitable institutions.

ELBING, a seaport town of eastern Prussia, on a river of the same name, and on the Berlin and Königsberg railway, 34 m. E. S. E. from Dantzic; pop. 24,000. It is composed of the old and new towns and several suburbs, is surrounded by ruinous walls and ramparts, and contains 8 Protestant churches, 1 Catholic and 1 Mennonite church, and 1 synagogue. Among its public buildings the most remarkable is the church of Notre Dame, a structure of the 14th century. A college founded here in 1536 has a library of 18,000 volumes; and among its benevolent establishments are several endowed by Mr. Richard Cowle, a wealthy Englishman, who took up his residence in Elbing in 1810 and

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died in Dantzic in 1821. Elbing has manufactories of sugar, potash, tobacco, soap, chicory, vitriol, leather, and woollen fabrics. Its maritime trade is very active, its exports being its own manufactures, and its imports grain and wine. This place owes its origin to commercial establishments founded by colonists from Bremen and Lübeck in the 13th century, under the protection of a fortress constructed by knights of the Teutonic order. It was early admitted into the Hanseatic league, placed itself under the protection of Poland about the middle of the 15th century, and in 1772 was annexed to the Prussian dominions.

ELCESAITES, a sect of Asiatic Gnostics, founded in the reign of Trajan, a branch of the Jewish Essenes, kindred to and finally confounded with the Ebionites. A Jew by the name of Elxai or Elcesai is supposed to have been their founder. Their most distinctive tenet was that man is but a mass of matter in which the divine power is concealed. They were tenacious of their oaths, favored early marriages, and rejected the Pentateuch and the epistles of Paul.

ELCHE (anc. *Ilici*), a town of Spain, province of Valencia, 13 m. S. W. from Alicante, 8 m. W. from the Mediterranean; pop. 22,800. It is girdled on every side by forests of palm trees, and has been named the city of palms. The chief industry of the place is employed in the culture and exportation of dates, which are inferior to those of Barbary.

ELCHINGEN, a Benedictine abbey of mediæval celebrity, founded in 1128 upon a steep mountain in Bavaria, 7 m. from Ulm. Amid the massive buildings which composed this abbey, the church, which was destroyed by lightning in 1773, was especially distinguished. In its place another has been constructed in an even more ancient style of architecture. The abbey of Elchingen gives its name to 2 villages situated 3 m. apart upon opposite sides of the mountain. The battle of Elchingen, Oct. 14, 1805, was one of the most brilliant episodes in the Austerlitz campaign of Napoleon, and gained for Marshal Ney the title of duke of Elchingen.

ELDER (*sambucus Canadensis*, Linn.), a showy shrub, well known from its numerous flat cymes of white flowers appearing in June, to be succeeded by heavy black-purple, crimson-juiced berries in August, and overtopping the wild reeds and bushes on the borders of fields. On account of its long and spreading roots it is sometimes troublesome to the farmer. A wholesome sudorific decoction is prepared from its flowers, which are carefully gathered and dried for the purpose; the fruit is much esteemed by some in the manufacture of a sort of wine, while the pith of the stem furnishes excellent pith balls for electrical experiments. There is another species (*S. pubens*, Michanx), which has a scarlet fruit, fully ripe at the time the former is in blossom. The flowers of this are handsome, of a greenish or purplish white, borne in thyrse-like spikes. The plant is well worthy of cultivation where it is not found growing wild.

ELDER, an overseer, ruler, or leader. The reverence paid to the aged in early times was doubtless the origin of this title, it being used as a name of office both among Jews and Christians. Macknight thinks it was applied in the apostolic age to all, whether old or young, who exercised any sacred office in the Christian church. Elders or seniors, in the ancient Jewish polity, were persons noted for their age, experience, and wisdom; of this sort were the 70 whom Moses associated with himself in the government of Israel, and such also were those who afterward held the first rank in the synagogue as presidents. Elders, in church history, were originally those who held the first place in the assemblies of the primitive Christians. The word presbyter is sometimes used in the New Testament in this signification, and as interchangeable with *επισκοπος*; and hence the first meetings of Christian ministers were called *presbyteria*, or assemblies of elders. Elder and elders, with the Baptists, are terms used to designate ministers of the gospel generally. With the Presbyterians they are the officers who, in conjunction with the ministers and deacons, compose the church sessions, representing the church itself, conducting its discipline, and aiding in the promotion of the interests of religion. They are chosen from among the people, usually for life; are generally set apart to their office with some public ceremony; and their number is different in different churches.—It has long been a matter of dispute whether there are any such officers as lay elders mentioned in Scripture. On the one side, it is said that these officers are nowhere mentioned as being alone or single, but always as being many in every congregation; that they are mentioned separately from the brethren; and that their office is described as being distinct from that of preaching, he that ruleth being expressly distinguished from him that exhorteth or teacheth. On the other side, it is contended that the distinction alluded to does not refer to different orders of officers, but only to the degree of diligence, faithfulness, and laboriousness with which they discharge their duties and fulfil their ministerial work; and that the emphasis in such passages as 1 Timothy, v. 17, is to be laid on the word "labor," not on the word "especially," as though the latter were intended to distinguish between two different classes of elders, one superior, in some respects, to the other.

ELDON, John Scott, earl of, lord chancellor of England, born in Newcastle-upon-Tyne, June 4, 1751, died in London, Jan. 13, 1838. His father was a man of respectable fortune, engaged in the coal trade. John was taught in the grammar school of his native town, by the Rev. Hugh Moises, and in May, 1766, instead of being apprenticed to the coal business, as his father had designed him to be, he was sent to his brother William, afterward Lord Stowell, who was then a tutor at Oxford. He was entered a commoner of University college, was chosen to a fellowship in July, 1767, took his bachelor's

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degree in Feb. 1770, gained the chancellor's prize of £20 for an English prose essay in 1771, intending all the while to take orders, but this plan was changed in 1772 by his running away with Miss Elizabeth Surtees, the daughter of a Newcastle banker. He was married at Blackshiels, in Scotland, Nov. 19. The bride's family for a while refused to see her; but about the beginning of the next year the sum of £2,000 was settled upon each of the young couple by their respective parents, and the newly married pair went up to Oxford, where John was to study for the law. He was admitted of the Middle Temple in 1773, intending, however, to enter the church if a college living should fall vacant during the year of grace for which he was allowed to retain his fellowship after marriage. The anniversary of his marriage destroyed his last hope of ecclesiastical preferment, and he thenceforth bent his whole mind to the profession which circumstances seemed to have forced upon him. In 1774–'5 he was a tutor in University college, where, however, he probably did no more than superintend the law studies of some of the members, and at the same time he obtained the appointment of vice-principal of New Inn hall and vice law professor, his duties being to read the lectures written by his superior, Sir Robert Chambers. Beside the faithful study of Coke upon Littleton, he read and remembered all the reports, rising at 4 in the morning and reading until late at night. In 1775 he removed to London, where an eminent conveyancer, Mr. Duane, took him into his office without the customary fee; and in Feb. 1776, he was called to the bar. In after life he loved to speak of the difficulties of his early career; but in truth, after a shorter period of inaction than falls to the lot of most young lawyers, he seems to have risen steadily, and his fortune was made by his famous argument in the case of Ackroyd *vs.* Smithson, which Lord Thurlow decided in his favor on appeal in March, 1780. In the following year he still further advanced his prospects by his display of ability in the Clitheroe election case, which he undertook in the absence of other counsel, at a few hours' notice. A plan which he had entertained of settling in Newcastle was now abandoned. In June, 1783, on the formation of the coalition ministry of Fox and Lord North, he was one of several junior counsel who were called within the bar, and a few days after he was made a bencher of his inn of court. The influence of Lord Thurlow procured him a seat in the house of commons as representative of Lord Weymouth's borough of Weobly, and on Dec. 20, 1783, he delivered his maiden speech in opposition to Mr. Fox's East India bill, but with little success. Scott, in fact, was no orator, and though he afterward spoke with effect, especially on legal questions, and proved a powerful member of the tory party, he never acquired the fame of a good debater. On the accession of Mr. Pitt, in March, 1784, he came into parliament again as a member for Weobly, but in the following year he supported Mr. Fox in the famous Westminster scrutiny case, and laid down the principle which has since passed into law, "that the election must be finally closed before the return of the writ, and that the writ must be returned on or before the day specified in it." His first official appointment was to the chancellorship of the county palatine and bishopric of Durham, in 1787; and in June, 1788, he was made solicitor-general, and received the honor of knighthood. Scarcely had he entered upon his new office, however, when the great political crisis arising out of the king's insanity threatened to turn him and his party adrift. Mr. Pitt proposed to confer limited powers as regent upon the prince of Wales by act of parliament, and this measure the solicitor warmly upheld, advocating the use of the great seal in the king's name, and broaching a doctrine which virtually placed supreme power in the hands of the person who held the seal for the time being. The bill was stopped in its passage by the king's recovery, but the line of action then laid down dictated the course of the ministry at a later period. In 1793 Sir John was made attorney-general, and as such conducted the famous state trials of 1794, in which he was opposed to Erskine. Scott failed to obtain a conviction, notwithstanding a speech of 9 hours' duration, and was, moreover, exposed to considerable bodily danger from the excited populace. In July, 1799, on the death of Sir James Eyre, he obtained the post of chief justice of the common pleas, and with it the rank of Baron Eldon of Eldon, his title being taken from an estate which he had purchased in the county of Durham. Shortly after the formation of Mr. Addington's ministry, in 1801, he became lord chancellor, receiving his appointment, it is said, directly from the king, who was pleased to intrust the great seal to one whose anti-Catholic zeal accorded so well with the royal sentiments. He contributed to the overthrow of Mr. Addington and the formation of Pitt's second administration, in which he retained his office, but he resigned it when the whigs came into power under Mr. Fox and Lord Grenville, in Feb. 1806. He was an active member of the opposition, and with the purpose of breaking down the whig cabinet by enlisting sympathy for the princess of Wales, he is supposed to have produced, in conjunction with Mr. Perceval, the famous "Book," whose origin was so long a mystery; but its publication was stopped when the tories came into power by the cry of "danger to the church," and on April 1, 1807, Lord Eldon took his seat again upon the woolsack. He was now at the height of favor and influence; his intimate relations with the king, no less than his official position, gave him a share in the administration such as no chancellor had enjoyed for many years; and though the assertion of Lord Brougham that he did three fourths of the governing of the country for a whole generation may be exaggerated, it is certain that at times when the king was notoriously incompetent he put the great seal to uses from which his more timid associates drew back, and in parliament the

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severest strictures were passed upon his conduct. When the recovery of the king became no longer probable, Lord Eldon began to cultivate the favor of the regent, suddenly took side against the princess Caroline, and bought up as many as possible of the few copies of the "Book" which had got into circulation. In the ministerial intrigues following the assassination of Mr. Perceval he was the secret adviser of the prince, and the real author of Lord Liverpool's administration, which lasted with slight changes until the death of that minister in 1827, a period of 15 years. Lord Eldon's devotion to his "dear young master" was not without reward. On the death of George III. he was confirmed in his office, and by his subsequent part in the matter of the proposed divorce he earned the dignity of Viscount Encombe and earl of Eldon, which George IV. conferred upon him, July 7, 1821. But with the introduction of more liberal views than had hitherto ruled the nation, Lord Eldon's influence began to wane. Though still honored, he was less and less consulted. The ideas which he had brought with him from the previous generation, his uncompromising hostility to reform in law or parliament, his firm stand against Catholic emancipation, his coercion of the press, were no longer the principles of the government; and when Mr. Canning became minister, in 1827, he resigned the great seal, and was succeeded by Lord Lyndhurst. He never again took office, though he showed on several occasions a readiness to do so; and in 1835 he withdrew entirely from public life, taking with him a large fortune, the legitimate fruit of his position. As a lawyer, Lord Eldon ranks among the greatest who have ever adorned the bench or bar of England. Without a mind of the highest order, and little versed in the civil or in foreign codes, he was unsurpassed in knowledge of English law and in subtlety and acuteness of intellect; but his habitual hesitation in deciding, beside proving ruinous to suitors, encumbered the court of chancery with a vast arrear of causes which was often the subject of parliamentary animadversion. Hence, according to Mr. H. Twiss, his biographer, it was in the common law courts, where he was forced to decide without delay, rather than in the courts of equity, that he gained his greatest reputation. His opinions, from the study bestowed upon them, are of the first value, but they are often expressed in confused and obscure language. As a politician, he was distinguished by adroitness, tact, and a boldness strangely in contrast with his hesitation on the bench; but he was not a great statesman, and knew little of foreign politics. He had a horror of innovation, looked upon the reform bill of 1831 with mingled fright and amazement, and, with a morbid fondness for political prosecutions, boasted that he had caused more actions for libel in 2 years than had taken place in 20 years before. His demeanor on the bench was courteous and affable. His domestic life was eminently happy and virtuous; his good humor seldom forsook him, and he had the reputation of being one of the most entertaining story tellers of his day. In his "Anecdote Book," a sort of autobiography compiled in his old age, he does little, however, to sustain his character as a humorist, and shows a lack of literary culture not surprising in one who from the age of 22 read nothing but law books and the newspapers.

ELEANOR OF AQUITAINE, queen of France and afterward of England, born in 1122, died March 31, 1204. She was the eldest daughter and heiress of William IX., duke of Guienne or Aquitaine, and was married, Aug. 2, 1137, to Prince Louis, who in the same year succeeded to the throne of France as Louis VII. She was gay, frivolous, a lover of poetry and art, and could not sympathize with the ascetic spirit of her husband. She accompanied him on the second crusade to the Holy Land in 1147. At that time he complained of her preference for other men, and on their return from Asia they were divorced, March 18, 1152. A short time afterward she bestowed her hand upon Henry Plantagenet, the future Henry II. of England. This alliance, which made Henry master of Eleanor's vast possessions in France, produced pernicious and protracted wars between France and England. She bore him many children, but his infidelities and neglect changed her love into hatred. She incited her sons Geoffrey and Richard to rebel against their father, was arrested in 1174, and remained in confinement until after Henry's death in 1189, when she was released by his successor, Richard I., Cœur de Lion, who placed her at the head of the government on his departure for the Holy Land. She negotiated his marriage with the daughter of the king of Navarre, and went to Germany with his ransom from captivity. She afterward retired to the abbey of Fontevrault, and surviving Richard, lived to see him succeeded by one of her other sons, John Lackland, the signer of Magna Charta. She was a favorite personage with the troubadour poets of the day, and appears in a very different light in their works from that in which she is represented by the French and Norman chroniclers.

ELEATIC SCHOOL, a group of Greek philosophers, beginning with Xenophanes of Colophon, who settled in Elea or Velia, a Greek colony of southern Italy, in the 6th century B. C., and whose principal disciples were Parmenides and Zeno, both of Elea, and Melissus of Samos. Some of the ancients also ranked Leucippus and Empedocles among them, which has led several historians of philosophy to distinguish two Eleatic schools, one of metaphysics and the other of physics. But apart from the radical difference which separates the doctrines of Empedocles and Leucippus from the system of Xenophanes and Parmenides, there is no evidence that the latter philosophers were at all associated with the former. It can only be affirmed that they were all contemporary, and that the writings of Parmenides probably contributed to the modification of Ionian ideas

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wrought by Leucippus, and to the changes in the system of Pythagoras made by Empedocles. The general spirit of the school may be defined as an attempt, perhaps the first ever made, to refer all science to the absolute and pure ideas of the reason. There are, according to the Eleatics, two kinds of knowledge, that which comes to us through the senses, and that which we owe to the reason alone. The science which is composed of the former is only an illusion, for it contains nothing true, fixed, and durable. The only certain science is that which owes nothing to the senses, and all to the reason. Children and the untaught may believe in the reality of sensible appearances, but the philosopher who seeks the foundation of things should appeal only to the reason. There are two principles in nature, on the one side fire or light, and on the other night or thick and heavy matter. These principles are distinct but not separate; they act in concert, playing together a perpetual and universal part in the world. The world is bounded by a circle of light as by a girdle, and is divided into 3 parts, in the central one of which necessity reigns sovereign. The stars are but condensed fire, and the earth is the darkest and heaviest of all bodies. It is round, and placed by its own weight in the centre of the world. Men are born of the earth, warmed by the solar rays, and thought is a product of organization. From this commingling of fire and earth have begun all the things which our senses show us, and which will some time perish. But in all these physical phenomena there is no true science. Reason is the exclusive source of certainty, and reason conceives and recognizes as true nothing but absolute being, being in itself considered, that is, as disengaged from every particular, fleeting, and perishable circumstance, modification, or accident. Thus every thing which has ever begun to be, every thing which is susceptible of change or modification, of birth or destruction, has no veritable existence; it is not being, but only appearance. Beside being, in this sense of the word, there is, according to the Eleatics, only nothingness, and as this is but the negation of all things, one can neither affirm it nor deny it. Being is eternal, unchangeable, self-existent; it has neither past nor future, neither parts nor limits, neither division nor succession; it is then an absolute unity, and every thing else is but an illusion. Thus, the Eleatic system denies the data furnished by the senses, denies the generalizations and abstractions which the reason founds upon such data, and affirms only those necessary ideas which reason owes solely to itself, and which it employs in its operations. The result is a pantheism, in Xenophanes resembling the blended material and spiritual pantheism of Spinoza, and in Parmenides approaching the spiritual idealistic pantheism of Fichte.

ELEAZAR (Heb., God is help), the name of several ancient Hebrews. The most noted of them was the 3d son of Aaron, who held in his father's lifetime the oversight of the Levitical order, and on Aaron's death was raised to the dignity of high priest. His pontificate was contemporary with the military government of Joshua, and the book of Joshua closes with an account of his death and burial.—ELEAZAR, son of Dodo, was one of David's 3 mighty men, who smote the Philistines till his hand was weary, and who with 2 others broke through the Philistine host to bring to David a draught of water from his native Bethlehem.

ELECAMPANE, the root of the plant *inula helenium*, a handsome shrub, which, introduced into America from Europe, is now common in our gardens, and grows wild in meadows and by the roadsides in the northern states. The root should be dug in autumn and of the second year's growth. It has an agreeable aromatic odor when dried, somewhat like that of camphor, and its taste when chewed is warm and bitter; water and alcohol extract its peculiar properties, the latter most readily. Its extracts afford the vegetable principles alantine or inuline, resembling starch, and helenine, which forms long white crystals. The powdered root or the decoction in water is used in medicine as a tonic and stimulant. It is prescribed in chronic diseases of the lungs.

ELECTOR, or PRINCE ELECTOR (*Kurfürst*), in the old German empire, the title of those princes who enjoyed the privilege of electing (*küren*) the emperor, or rather the king, for the rulers of the German empire were originally as such only kings. Under the Carlovingians the government was hereditary. After their extinction the most powerful princes, such as the dukes of the Bavarians, Saxons, Swabians, Franconians, and Lotharingians, were accustomed to come to an understanding as to the one to be selected from among their number to rule over all the German tribes. This was done without any specific law, the electors being simply powerful enough to contest any election made against their will. But in the course of time the electoral privilege became a right inherent in certain territorial possessions, viz.: the archbishoprics of Mentz, Treves, and Cologne, and the principalities of the Palatinate, Saxony, Brandenburg, and Bohemia. The incumbents of these principalities acted as electors for the first time in 1256, when they chose Richard of Cornwall. A century later their exclusive privilege was guaranteed to them by the "Golden Bull." In 1648 an 8th electorate was established for the Palatinate, whose rights had been transferred to Bavaria during the 30 years' war; it became extinct in 1777. In 1692 the duchy of Brunswick-Lüneburg was raised to the rank of an electorate. When the German empire was tottering to its ruin in consequence of the wars with revolutionary France, the electoral college was entirely remodelled. The ecclesiastical electors having lost their possessions on the left bank of the Rhine, 3 secular princes were raised to the rank of electors, viz.: the margrave of Baden, the duke of Würtemberg, and the landgrave of Hesse-Cassel; beside these, the grand duke of

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Tuscany, having been made archbishop of Saltzburg and afterward of Würtzburg, was recognized as an elector. But when, in 1806, the emperor Francis abdicated the German crown, the electoral system came to an end. Bavaria, Saxony, and Würtemberg became kingdoms (the electors of Brandenburg had been kings of Prussia since 1700); Baden was a grand duchy; and the elector of Hesse-Cassel was deprived of his dominions, which were afterward incorporated in the new kingdom of Westphalia. Thus, for 6 years, the title of elector had no legal existence, until it was revived after the downfall of the king of Westphalia by the elector of Hesse-Cassel, now the only prince bearing that title. The prince electors enjoyed not only the privilege of choosing the German kings, but also that of subjecting them to certain stipulations and conditions, which, in many cases, were so exacting as to leave the monarch scarcely a shadow of power. By the "Golden Bull" the electors are called "the seven columns and pillars of light of the holy empire," also "the members of the imperial body." It was one of their privileges to offer their advice to the emperor whether he asked for it or not. They were also entitled to all royal honors, except the title of majesty. The electors had each a special function in the administration of the empire or the imperial household. Thus, the elector of Mentz was arch-chancellor of the empire, chairman of the electoral college and of the diet; the elector of Treves was lieutenant arch-chancellor for Germany; that of Cologne the same for Italy; the elector of Bohemia arch-cupbearer; the elector of the Palatinate arch-dapifer and lieutenant of the emperor in the Rhenish provinces; the elector of Brandenburg arch-chamberlain; the elector of Saxony arch-marshal and vice-president of the diet; that of Brunswick-Lüneburg arch-treasurer. The electorates created shortly before the dissolution of the empire had not yet been endowed with special functions.—In the political system of the United States, electors are chosen by the people of each state to elect the president and vice-president. Each state chooses as many electors as it has members in the two houses of congress; and these electors meet at the capitals of their respective states, on the 1st day of January next after the election, and cast their votes for president and vice-president. These votes are then sealed up and carried by special messengers to Washington, where they are opened and counted in the presence of both houses of congress, and the result proclaimed by the president of the senate.

ELECTRA (in Gr., the bright or brilliant one), daughter of Agamemnon and Clytemnestra, sister of Orestes, Iphigenia, and Chrysothemis, was, when her father departed to the Trojan war, confided with her mother and brother to the care of Ægisthus. Clytemnestra yielded to the addresses of her guardian, and when after 10 years her husband returned to Greece he was murdered in his own house. The vengeance of the guilty mother and her accomplice threatened death also to Orestes, but Electra discovered his danger, and sent him away to King Strophius of Phocis, who had him educated with his own son Pylades. Orestes had hardly attained the strength of manhood when Electra sent secret messengers to him urging him to undertake the duty of vengeance. With his friend Pylades he came in disguise to Argos, made himself known to his sister, and slew both Ægisthus and Clytemnestra in the palace. The guilt of matricide awoke the Furies against him, who stung him to madness, and pursued him over the earth. On the shore of the Tauric Chersonesus he was about to be sacrificed by the priestess of Diana, his own sister Iphigenia, who was ignorant of the relationship. According to some, the report even reached Greece that he had perished. Electra in despair rushed to the oracle of Delphi to learn the particulars. At the same time Orestes, Pylades, and Iphigenia arrived there. A casual word having at the last moment revealed Orestes to his sister, Electra was about to hurl a firebrand into the face of Iphigenia, when her arm was stayed by Orestes. Electra became the wife of Pylades, and the mother of Medon and Strophius. Her story has been treated from various points of view by almost all the great tragedians, by Æschylus, Sophocles, and Euripides among the ancients, and by Racine, Alfieri, and Goethe among the moderns.

ELECTRIC FISHES. The extraordinary modification of the peripheral extremities of nerves by which electricity is generated and discharged, is found in 4 genera of fishes, and in no other class of the vertebrata. The best known of these fishes will be described under TORPEDO; a second, the *gymnotus* or electrical eel, has been already mentioned under EEL; the other two will be briefly alluded to here, as there is no common name under which they would properly come. The 3d electrical fish belongs to the family of *siluridæ*, and the genus *malapterurus* (Lacép.). The *M. electricus* (Lacép.) differs from the common siluroids in having no anterior dorsal fin nor pectoral spine; the skin is naked and scaleless; there is an adipose dorsal fin near the caudal; the ventrals are just behind the middle, and the anal occupies about half the distance between them and the rounded caudal; the body is stout, the tail thick, and the head short and conical; the lips are fleshy, with 6 barbels; 5 villiform teeth in each jaw, none on the vomer. The fish attains a length of 18 or 20 inches, and is found in the Nile, Senegal, and other rivers of northern and central Africa; the color is cinereous or olive above, spotted and irregularly marked with black, whitish below; anterior nostrils tubular. The existence of a fish with benumbing powers in the Nile has been known for more than 300 years, but Geoffroy and Rudolphi were the first to give detailed descriptions of the electric organs. Valenciennes describes these as forming on each side of the body, between the skin and the muscles, 2 thin

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layers of spongy cellular tissue uniting together small lozenge-shaped cells filled with gelatinous fluid, and 6 or more fine longitudinal membranes; combining the structure of these organs in the torpedo and gymnotus, and receiving the nervous influence both from the lateral branch of the vagus and from the ventral branches of the spinal nerves. The shock given by this fish is comparatively feeble, the discharge taking place when the head is touched; no shock is felt when the tail is grasped, as the electric organs do not extend to this part; in giving a shock the tail is moved, as if the muscles were active. This fish is much esteemed as food. The Arabs call it *raash* (thunder).—The 4th electrical fish belongs to the order *plectognathi*, family *diodontida*, and genus *tetraodon* (Cuv.). The upper and under jaws are divided by a median sutnre, so that they seem to have 2 teeth above and 2 below, incorporated with the jaws; in most of the species of the genus, the body, except the head and tail, is rendered rough by spines made erectile by the inflation of the skin, or naturally erect; but in the electric species (*T. electricus*, Paterson) the skin is destitute of spines, in conformity with the ascertained law that no electric fishes have either scales or spines; the body is brown above, yellow on the sides, sea-green below, and varied with red, green, and white spots. It attains a length of 7 or 8 inches, and is found in the lagoons of the Pacific. Its electric powers are comparatively feeble.—The most characteristic feature of all these batteries is their enormous supply of nervous matter; the electric organs generate the electricity, which is rendered active by nervous influence. In the torpedo the shock is best received when one hand is placed on the back and the other on the abdomen of the fish; in the gymnotus the intensity of the shock is in proportion to the length of the fish included between the hands; actual contact with the torpedo is not essential, as it is well known by the Neapolitan fishermen that the shock is felt when water is dashed npon it, the electric current passing np along the stream, the circuit being completed through the earth to the ventral surface of the fish; the dorsal surface is always positive, and the ventral negative. That this is the same as common electricity has been shown by Matteucci and Faraday; it renders the needle magnetic, and decomposes chemical compounds; by it heat is evolved, and the electric spark is obtained. The exciting nerves terminate in loops, as in the muscular tissue, and they arise like motor nerves from the anterior tract of the cord; the reception and conveyance of impressions, and the voluntary act which results in the shock, are of the same nature and follow the same course as in muscular contractions; a division of the electric nerves at their origin arrests all voluntary shocks, but an irritation of the ends of the nerves in connection with the organ is followed by an involuntary electric discharge, just as an irritation of the end of a divided motor nerve in connection with muscle is followed by its contraction. The electric like the muscular power is exhausted by exercise, and recovered by rest; both are increased by energetic respiration and circulation, and both are exalted by the action of strychnine, which produces tetanic contraction of the muscles, and a rapid succession of involuntary electric discharges. The phenomena displayed by these fishes afford no ground for the opinion that nervous influence is identical with electricity; the former is no more identical with the latter than it is with muscular contractility; the contractility of the muscle resides in its fibre, and the electricity is generated in the battery of the fish; both are brought into play through nervous influence, but neither resides in or is a property of the nerves. The phenomena of heat, electricity, and phosphorescence within the animal body depend on chemical actions, which take place in the system just as they would in the chemist's laboratory, modified always by the mysterious vital principle. To show the energy of the electricity thus generated, it may be stated that, according to Faraday, the shock of the electric eel is equal to that of 15 Leyden jars of 3,500 square inches of surface; it is not surprising that a succession of these should prostrate a horse.

ELECTRIC LIGHT. This luminous appearance has been proved by Sir David Brewster to be of the same nature with all other light as regards the properties of polarization and single and double refraction, and he considers that the spark is a flame, consisting, like all other flames, of incandescent molecules in a state of minute subdivision, yet being producible in a vacuum it would seem not to be the effect of combustion. A most intense and steady electric light is evolved between two points of coke, forming the poles of a battery, and brought into close proximity. From its great brilliancy and cheapness this light would seem to be well adapted for illumination, especially for lighthouses, and if introduced into mines it would certainly prove the most powerful illuminating agent, without tending, like other lights, to contaminate the purity of the air. The difficulties which interfere with this application of the electric light are wholly of a mechanical nature, and though many expedients have been devised to remove them, the apparatus is still too cumbersome and costly for ordinary use. One of the principal obstacles to be overcome is the continual separation of the charcoal or coke points, as these are slowly consumed. A practical application was made in the year 1858 of the electric light, by Dr. Watson of the "Electric Power Light and Color Company," to facilitate the operations connected with the erection of the new bridge at Westminster. To give light to the workmen employed during low tide at night, he made use of an apparatus computed to have the illuminating power of 72 Argand burners, or of nearly 1,000 wax candles, placing it on the bank of the river about 200 feet distant from the working stage. Upon this 45 men were en-

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gaged in pile driving. The battery, placed 2,000 feet off, was fitted with 72 cells. The reflector used was that known as Chappuis's. The light diffused over the stage was more brilliant than that of the brightest moonlight. It was fully as manageable as that of gas, and is said to be furnished at the lowest cost of gas (which in London is very low), a considerable profit being realized from the application of the residuary products of the battery to the manufacture of colors.—According to the recent experiments of M. Edmond Becquerel, made under favorable circumstances with a battery of zinc and platinum, the least cost of the electric light, compared with that of some other means of illumination, may be thus stated. Using as a standard the light of 350 sperm candles of best quality,

The cost of coal gas at $1 60 per 1,000 cubic feet was		$0 85
"	oil (rape seed) at 17 cts. per lb. was	0 65
"	stearine candles at 32 cts. per lb. "	2 59
"	wax candles at 55 cts. per lb. "	3 12
"	electric light "	0 68

At the usual prices of gas in the United States, the electric light under present expenses of the battery is a more costly method of illumination, but may still be much cheaper than candles. (See ELECTRO-DYNAMICS.)

ELECTRIC TELEGRAPH. See TELEGRAPH.

ELECTRICITY. In the article AMBER, it has been already remarked that electrical phenomena were first noticed in this substance by the ancients, at least as far back as Thales of Miletus, who lived in the 7th and 6th centuries before the Christian era. From the Greek word for amber, *ηλεκτρον*, the name electricity was applied to the obscure force which produced these effects. As the substance gave its name to the phenomena, so the most obvious of these, the property of amber when rubbed of attracting light bodies, gave the name with the Arabs of *karabé*, or "catch-chaff," to the fossil gum; and it is by no means certain, as suggested by Sir David Brewster, that the Greek name itself may not come from *ελκω*, to attract, and *θριξ*, a hair or filament, or *θριον*, a leaf. This singular property of amber was regarded merely as a curious isolated fact; nor were the phenomenon of crackling sparks emitted in removing the clothing from the body, and the exhibition of animal electricity observed in the torpedo, considered as matters that could prove of any considerable interest or importance to mankind. Not until the investigations of Dr. Gilbert, of Colchester, England, made about the year 1600, had any progress been made toward elucidating or classifying these phenomena, or adding to their number. He found that a large number of substances were excited like amber by friction and attracted light bodies, that their capacity of doing this was greater in cool dry weather than when the air was warm and moist, and that many other substances were apparently deficient in this property. The publication of his experiments directed the attention of other philosophers to the subject, and this soon became one of the most interesting and popular fields of scientific research. New discoveries were rapidly made, and with every new step gained the subject assumed a greater importance, extending in unexpected directions, so as to embrace phenomena of the highest interest to man, and linking itself with departments of physics with which it was before supposed to have no relation. Thus these investigations have continued for more than 200 years to attract the profound attention of the ablest philosophers; and at this day no subject is more worthy of their study, or opens a more promising field for original research, than the boundless range of electricity in its many departments. As developed in animal bodies, it has already been treated in this work in the article ANIMAL ELECTRICITY. (See also EEL (ELECTRIC), ELECTRIC FISHES, and TORPEDO.) In the present and succeeding articles it will be treated: 1st, in its ordinary exhibitions as produced by friction, heat, &c.; 2d, under ELECTRO-DYNAMICS, in the form commonly recognized by the name galvanic electricity; 3d, as connected with magnetism in the form called ELECTRO-MAGNETISM; 4th, in the application of this branch of the subject to the useful arts in ELECTRO-METALLURGY. Atmospheric electricity, with particular reference to the experiments of Franklin, will be more fully noticed under LIGHTNING. Electricity as developed by magnetism will be treated under MAGNETO-ELECTRICITY.—The prominent electrical phenomena are exhibited by very simple experiments. A glass tube, dry and clear, when rubbed with a warm silk handkerchief, attracts light objects, as slips of paper, gold leaf, a feather, or a pith ball suspended by a silken thread. The property thus developed is called electricity, and the body in which it is generated is called the electric. The light body attracted, after remaining in contact with the glass for a few seconds, and being then shaken off, is no longer attracted, but on the contrary is repelled. But if the light body be touched with the finger, it is then placed in a condition to be immediately attracted again by the glass. A stick of resin or sealing wax rubbed with dry flannel will be found to produce the same result as the glass tube; but if the two electrics be applied one on each side of the suspended pith ball or feather, and at a short distance from it, the light body is observed to be attracted toward one, and when repelled to be instantly attracted by the other; and thus it will continue to fly backward and forward between the two, until the excited condition of both bodies disappears. The electricity excited by glass is thus found to be of a different quality from that excited by resin. M. Du Fay, who made this discovery in 1733, distinguished these by the names of vitreous and resinous electricity, which names still continue in use. Dr. Franklin gave the name of positive electricity to that called vitreous, and negative to the resinous. These are now sometimes represented by the symbols +, plus, and —, minus. (The theories of Du Fay and Dr. Franklin are more fully discussed in the article ELECTRO-MAGNETISM.) If the silk used to rub the glass be pre-

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sented to the pith ball, it will be found to act like the resin; and the flannel used to rub this will be found in the same way to possess the same kind of electricity as the glass. Hence, in the development of electricity by friction, one kind is found to be produced in the electric, and the other in the material used as a rubber, and the same quantity of electricity in each. In the multitude of bodies which may become electrically excited by being rubbed together, it is not always obvious which will possess the vitreous and which the resinous electricity. The numerous experiments that have been tried, however, seem to have developed some laws which determine this result. Of two bodies thus excited, that which radiates heat most readily assumes the positive electricity, and the other the negative. Silver rubbed upon lead is positively electrified, but if upon iron, which radiates heat better than silver, it takes negative electricity, and iron the positive. But this may be reversed in bodies of nearly the same radiating power, in case the one radiating best is heated, and its surface is quite rough. Surfaces which are uneven, so that the particles are considerably disturbed in the rubbing, incline to take the negative electricity; thus, when a rough and a smooth ribbon are rubbed across each other, the former is negatively and the latter positively electrified. A black ribbon rubbed upon a white one becomes negative, the surface probably being more rough. —In the experiment of touching the pith ball with the finger, its electrical property is found to be instantly removed, so that it becomes indifferent in its attraction either to the glass or the resin; touched with a metallic rod held in the hand, the same effect is produced. But the glass or resinous rods do not thus strip it of its electricity. A difference in bodies is thus noticed as to their property of conducting electricity, and a distinction is established between those which are good and those which are bad conductors. It is this facility of rapidly conducting away electricity that prevents many solid bodies from being regarded as electrics, though all of them may be made to develop electricity by friction. A metallic rod or tube provided with a handle of glass or resin may be made like the glass tube to develop electricity, its escape being checked by the non-conducting glass, which is said to insulate the metal. Bodies which thus act as poor conductors are called insulators, but the distinction between them is only in degree. Shellac, amber, resin, glass, brimstone, &c., may be called either good insulators or poor conductors. The same bodies also differ in their conducting property by slight changes in their composition, and by change in their structure, such as is caused by change of temperature; thus glass is made a conductor by being heated to redness, and vegetable bodies are changed to non-conductors by being deprived of their moisture. The metals are the most perfect conductors, and then follow charcoal, graphite, saline and animal fluids, ores, water, snow, animal bodies, &c. The worst conductor, which consequently heads the list of electrics or insulators, is shellac, or perhaps gutta percha, after which follow amber, the resins, sulphur, wax, jet, glass, mica, gems and various minerals, silk, wool, hair, feathers, paper, baked wood, &c. But a coating of moisture upon these renders them conductors, as a coating of wax or resinous varnish upon the surface of the bodies classed as conductors deprives them of their characteristic property. An example of the immense differences which are found in the capacity of the various conductors to convey electricity is represented in the comparison of iron wire with water, the resistance to be overcome in passing through an inch of the fluid being fonnd equal to that experienced in traversing 400,000,000 times the distance of the wire. The velocity of electricity along good conductors has been variously estimated by different experimenters, some making it to exceed that of light in its passage through the atmosphere. The principle of the movement is as obscure in the one case as in the other, as is our knowledge of the nature of the forces themselves. In a row of pith balls suspended near each other the excess of electricity contained in one is transmitted to the next by perceptible movement of the particles. As the distance which separates the particles is diminished, the capacity of rapidly conveying electricity is increased; but when the particles are brought into contact, no movement of this kind is apparent to the senses. So it is perhaps that the mind fails to conceive the mode by which the particles of air transmit the shock between the electric cloud and the earth, or those of a metallic wire through a long line of it, at the rate, it may be, of more than 100,000 miles in a second of time.—Various machines are in use for generating and collecting electricity by friction. A common form of these is a hollow cylinder of glass made to revolve upon a horizontal axis against a cushion or rubber stuffed with hair or wool and covered with soft leather. A flap of oiled silk, attached by one edge to the rubber, passes from this over the upper surface of the cylinder, upon which it rests, the object of which is to prevent the dissipation of the vitreous electricity as this is carried over from the rubber by the revolution of the cylinder. The supply is furnished by means of a chain attached to the rubber and leading to the floor or to the table. The rubber is thus not insulated, and the resinous electricity excited in it is not ordinarily collected for experiments, as is the vitreous. This is effected by means of a smooth metallic cylinder placed upon a solid glass leg, and extending parallel with the glass cylinder and about 2 inches from it on the side opposite to the rubber. Its ends are hemispherical, that no electricity may be lost by escaping from sharp edges. It is hollow, as weight and solidity are of no service, electricity at rest occupying only the surfaces of bodies. This portion of the apparatus is called the prime conductor. The electricity discharged from beneath the oiled silk is received upon metallic points, a row of which

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project like the teeth of a rake from the side of the conductor, and point toward the glass cylinder an inch or thereabout below the silk flap. The development of electricity is greatly increased by the application of an amalgam paste to the surface of the rubber, and also, as Dr. Faraday recommends, by impregnating with it the silk flap. It is made of 1 part of tin and 2 of mercury, mixed with tallow or lard to form a soft paste. A better preparation is to melt 2 oz. of zinc and 1 of tin in a crucible, and then pour in 6 oz. of mercury. It is to be well shaken in a box until cold, ground to powder in a mortar, and then mixed with lard. The paste should be thinly spread and occasionally renewed. The glass cylinder and all the apparatus must be kept clean and free from dust, and its efficiency will be increased by some method of keeping it warm and dry, as by making the pedestals which support the rubber and prime conductor hollow and open at the bottom, the stand being made double so as to admit a small alcohol lamp under each pillar. By such a contrivance the machine may be made to operate satisfactorily in a state of the atmosphere which under ordinary circumstances is unfavorable for the exhibition of electrical phenomena. As the electricity is excited by turning the cylinder, its presence is immediately indicated in the prime conductor by the divergence of a pair of pith balls suspended by a conducting thread, as one of linen, from a curved wire fastened to the top of this conductor. Excited by the same kind of electricity, they repel each other. By presenting the knuckle to a brass ball, which is commonly attached by a stem to the conductor, a spark is drawn from it which is both seen and felt. When highly charged, a succession of sparks may be taken off with great rapidity to any either neutral or negatively excited body brought near to the knob; or if there be points or sharp edges upon the conductor, the electricity will be seen escaping into the air in brushes of faint light. The electric spark is accompanied by a sort of explosive sound, with a display of considerable force, sufficient when produced in water contained in a strong glass tube to burst this with violence. In this and its zigzag dartings it exhibits its resemblance to lightning, which is in fact the same phenomenon upon a large scale. It is accompanied with heat, and appears sometimes in one or another of various shades of violet, blue, green, red, and yellow, and is sometimes a bright white. From the discoveries of Dr. Fosinieri of the transmission of infinitely small metallic particles, when a spark is produced between 2 metallic bodies, and of a concave indentation made in each of them, he concludes that the heat and light of the spark proceed from the ignition and combustion of the particles of ponderable matter, and that these are projected in opposite directions. For the glass cylinder a circular disk of plate glass, ¼ or ⅛ of an inch thick and 2 to 3 feet or more in diameter, is often substituted, and the most efficient machines are now generally constructed in this manner. The disk is set upon a revolving axis in a frame, the cross piece of wood over the upper edge of the disk supporting a double rubber, between the two parts of which the edge of the disk revolves, and another pair of similar rubbers are secured upon the base or platform, and by a screw are made to press between them the lower edge of the disk. A flap of silk passes from each rubber in the direction of the revolution of the disk, covering each side of it, and extending nearly one quarter of its circumference, where it meets the collecting points of the prime conductor. This is secured to a strong glass support, which projects horizontally from the frame on the side opposite the winch or handle, and then bends around like two elbows so as to present an extremity to the surface of the disk on two opposite edges. The arrangement is variously modified in different machines. An enormous machine, with a plate 11 feet in diameter, was in the Panopticon in Leicester square, London. The quantity of electricity developed increasing with the size of the plate, the power of this machine is probably greater than that of any other ever constructed. Dr. Hare of Philadelphia contrived a very neat form in which the disk was made to revolve horizontally. Other substances have been used instead of glass for the disks, as pasteboard soaked in copal or amber varnish, and coated with the same; wood has also been made into disks, and gum lac has been applied in the same way. A machine of great power was made in Brussels of a web of varnished silk, 25 feet long and 5 feet wide, revolving upon two wooden cylinders covered with woollen serge. As the cylinders were made to revolve by the exertions of 4 men, the silk passed between 2 cushions, each 7 feet long and 2 inches in diameter. These were covered with the skins of cats or hares, and could be made to press more or less upon the silk. The sparks produced by this machine were 15 inches long, and no one was inclined to receive one of them except upon the shoulder or elbow.—Phenomena have been frequently witnessed within the past few years in New York and other places in the northern portion of the United States, a notice of some of which by Prof. Loomis may be found in the "American Journal of Science" (vol. xxvi., July, 1858). Persons, especially children, wearing dry slippers with thin soles, and a silk or woollen dress, in a warm room heated to at least 70°, and covered with a thick velvet carpet, often become so electrically excited by skipping a few times across the room with a shuffling motion, and rubbing the shoe upon the carpet, that sparks are produced on their coming in contact with other bodies; and on their presenting a finger to a gas burner yet warm, the gas may be ignited. Sulphuric ether has been thus inflamed, and in dry cold weather sparks half an inch in length have been given forth by young ladies who had been dancing, and pulverized resin has been thus inflamed. Electricity is

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also generated by the steam escaping from boilers impinging upon hard substances, as in passing through bent iron tubes, which terminate in jets or small orifices of box wood. These receive one kind of electricity (most commonly the negative), and the boiler, if insulated, is found to be charged with the other. This effect, according to the investigations of Dr. Faraday, is induced by the friction of the particles of water in the steam upon the discharging tubes. A machine was constructed for the polytechnic institution in London, with a boiler 6½ feet long and 3½ feet diameter, of the Cornish form, with the fire chamber in the boiler, from which sparks are obtained 22 inches long, and so large and rapid in their succession as to appear like a continuous flame. One of these so-called hydro-electric machines has been constructed at the faculty of science in Paris. It is provided with 80 jets for the escape of the steam. The sparks form brilliant jets of fire by their rapid succession. Each spark is about a foot in length, and several inches in breadth. Electricity is moreover developed during the changes which bodies undergo in mechanical structure, and in others produced by chemical action; as, for example, when sulphur, wax, and other bodies, after being melted, return to a solid state on cooling, when gases are disengaged, and vapors are evolved; from the leaves of living plants as they disengage oxygen and carbonic acid; and also from decomposing vegetable matters. As rapid motion and friction develop it, the falling of rain and hail and the blowing of the wind may produce it in the enormous quantities in which it is generated in the atmosphere, and by evaporation still more may be developed by these atmospheric influences. As an example of the amount sometimes produced in the atmosphere, it is stated in Livingstone's "Travels in South Africa" (p. 137) that the hot wind which blows during the dry seasons over the desert from north to south "is in such an electric state that a bunch of ostrich feathers, held a few seconds against it, becomes as strongly charged as if attached to a powerful electrical machine, and clasps the advancing hand with a sharp crackling sound." By a little friction the fur of the mantles worn by the natives gives out a luminous appearance. It is produced even by the motion communicated in riding; and a rubbing with the hand causes sparks and distinct crepitations to be emitted. Dr. Hooker observed similar phenomena during a snow storm on Ben Nevis in 1825, the electricity causing a hissing sound in the air, and affecting the hair of the members of his party. De Saussure and others witnessed the same effects on Mount Breven in 1767.—What was supposed to be a peculiar quality of electricity was first observed by Dr. Seebeck of Berlin, and named by Prof. Oersted the thermo-electrical current. It is produced when two pieces of metal joined together at both ends are heated or cooled at one of their junctions. The current manifests its presence by causing the magnetic needle to deviate from its position. The direction of the current is found to be different, according as the action is that of cooling or of heating. The effect is supposed to be owing to the molecular change which the metal experiences by change of temperature. Other electrical phenomena have subsequently been exhibited by this method of excitation, and the production of sparks visible in the daylight, the decomposition of water, &c., cause this form of electricity to be now regarded as not differing from that generated by more familiar methods. The electric spark was obtained by Prof. Henry and Prof. Wheatstone in 1837 with a small cylindrical bundle of 33 elements of bismuth and antimony, ¼ of an inch in diameter, and ⅛ of an inch long.—Electricity is thus obtained by various methods, and insulated bodies may be charged with it by being brought in contact with the conductor, either directly or through a chain, wire, or other conducting body. Indeed its influence is felt upon bodies around that are not in contact with the electrified conductor, as is shown by bringing near to this an insulated metallic body, as a cylinder, upon which several pairs of pith balls are suspended by linen threads. An electrical excitement is seen by the divergence of these balls to be immediately induced; and it will be found that those suspended across the end nearest the prime conductor are affected with the opposite electricity from that of the conductor, and those at the remote end by the same electricity. The electricity that was quiescent in the body thus appears to have been disturbed by its proximity to another highly charged, and that portion which was of an opposite nature to the disturbing agent is drawn toward it, while that of the same nature is repelled. Between the two extremities is a point where no electrical excitement is displayed. This phenomenon is called electrical induction. It is upon this principle that the apparatus for collecting and retaining large quantities of electricity is based. The most simple form of it is a pane of glass coated on both sides with tin foil, with the exception of a margin of an inch in width all around. One side of this being placed upon some conducting body communicating with the floor, and the other side being connected with the charged conductor, the latter side is itself charged with the electricity of the conductor, while the metallic coating on the other side becomes at the same time charged with the opposite electricity. By this method charges of electricity may be accumulated proportional to the amount of metallic surfaces. The panes may be multiplied in number, and made to act as one by connecting all the insulated or upper coatings by a good conductor with that communicating with the prime conductor, and all the other surfaces by another good conductor with that communicating with the ground. The tendency of the two electricities thus accumulated is to rush together, and this they do instantaneously when a conducting medium is presented to each. The common method of restoring their equilibrium is by means of a stout wire or rod, with a metallic knob at each end, the wire bent or

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turned by a hinge to the proper curvature, and passing through a glass handle, by which it is held. This is called a discharging rod. A chain will effect the same purpose, or the discharge may be taken through the body by presenting one hand to each surface of the glass; and if any number of persons join hands, and the two at the extremities present a hand one to the upper and the other to the lower surface of the glass, the shock will instantly pass through them all. Instead of panes of glass, it is found more convenient to use wide-mouthed glass bottles or jars, which are coated inside and out nearly to the top with tin foil. These are called Leyden jars, from having been first used by Musschenbroek and others at Leyden in 1745. A cover of baked wood is fitted upon each one, and through the centre of this a brass rod passes nearly to the bottom, with which it connects by a short chain; its upper end terminates in a brass knob 2 or 3 inches above the cover. A number of these arranged together, the brass knobs at the top being connected by wires or a chain, and the outer coatings being also brought into communication with each other by good conductors, constitute an electrical battery, and this is charged from the prime conductor by connecting one of the knobs with it. With a battery of this kind, the metallic coatings of which amounted to 225 square feet, and charged by a powerful electrical machine constructed by Van Marum at Haarlem, Holland, shocks of such power were obtained that a piece of boxwood 4 inches long and 4 in diameter was rent apart, and the report produced was so loud as to stun the ear, while the flash dazzled the eye with its brilliancy. The heat generated was so intense that a small iron wire about $\frac{1}{12}$ of an inch thick and 25 feet long was fused into red-hot globules, which scattered in every direction. A piece of tin wire $\frac{1}{19}$ of an inch thick and 8 inches long disappeared in blue smoke, globules of melted tin at the same time falling upon a piece of paper and repeatedly rebounding. Magnetism was also developed by the shock, so that polarity was given to steel bars of 9 inches in length, nearly $\frac{1}{4}$ an inch wide, and $\frac{1}{12}$ of an inch thick. The machine which produced these effects was constructed of two disks of glass, 5 feet 5 inches in diameter, set upon the same axis, and provided with 8 rubbers, each of which was about 15 inches long and 2 inches wide. Bodies 40 feet distant were sensibly affected by the electricity excited by this machine, and pointed wires 28 feet distant directed toward the conductor were tipped with a star of light; and when a metallic ball communicating with the ground was presented to it, a brilliant jet of light 2 feet or more in length darted forth with a zigzag motion, throwing luminous brushes of light into the air.—It is interesting to observe the close relation between the pane of glass partially covered with metallic coatings and the arrangement of the natural bodies—the perfectly conducting atmosphere, corresponding to the glass, overlaid with the stratum of clouds of vapor and touching by its under surface the solid earth. Whenever either the stratum of clouds above or the earth below becomes charged with one kind of electricity, the opposite kind is induced in the other, and the same tendency is manifested of these two electricities to rush together and neutralize each other, as is observed in the electrified coatings upon the glass; and if with our imperfect apparatus, covering a few square feet of surface, we can produce effects so startling, we may the better appreciate the terrific power gathered upon surfaces adapted for accumulating electricity, extending over areas of many square miles, and charged by the action of the most powerful agents in nature. A particular quality of this natural electricity, common to it and the machine electricity generated by friction, is its intensity, or its property of violent action. In this it differs from the electricity generated by the galvanic battery, which is distinguished for the mildness of its character, while the quantity is remarkably large. The natural electricity obtained by friction has been compared to the heat developed in a bar of red-hot iron, while that produced by chemical action is more analogous to a larger quantity of caloric diffused through a vast body of water. The common electricity also, after being accumulated, has the property of remaining for a considerable time in an excited condition, and for this reason has been called statical or reposing electricity, in contradistinction to that generated by the battery, which exists only while it is evolved, and for this reason is termed current electricity. In most of the instances in which electricity is applied to useful purposes the violent shock is not what is required, but the feeble and continuous action of the galvanic current. It is consequently in the description of this form of electricity that the practical uses of this agent will be treated. One use of the machine, however, may be noticed in this place. When a shock is passed through strips of gold leaf placed between slips of window glass, the gold is melted and driven into the pores of the glass. On this principle metallic colors are impressed in ornamental figures upon silk or paper. The design is first cut out as in stencil plates on a piece of thick drawing paper, and this being laid between a piece of gold leaf and the object to be impressed, and the whole placed under a weight and the shock passed through the gold leaf, portions of this are projected through the lines of the design, and fixed upon the ground intended to receive them. By the shock various chemical compounds may be decomposed and gaseous mixtures separated, and their elements made to assume new combinations; but these phenomena are better exhibited by the battery, and will therefore be described in another article.—Statical electricity is developed in some cases by other agencies as well as by friction, as by pressure and heat. The mineral Iceland spar is especially remarkable for the electrical excitement occasioned in it when a rhomb held in one hand by its two

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opposite edges is touched upon two of its parallel faces by the fingers of the other hand. Being then held near the small needle of the electroscope (an instrument to be hereafter noticed), the mineral is shown to be excited by vitreous electricity. A number of other crystals, as fluor spar, topaz, mica, aragonite, &c., all of which are capable of being cleaved into laminæ, manifest the same property. The electricity thus developed has been found to continue, as noticed by Haüy, for 11 days without dispersion. When two substances are pressed together, the electricity is developed only on their separation, and in one it is vitreous and in the other resinous. Electricity obtained by heat is exhibited also by a variety of minerals, and especially by the crystal of tourmaline. Whenever its temperature changes, electricity is excited in it, in one end of the positive and in the other of the negative kind. If the change of temperature is rapidly produced, the electricity is sufficiently intense to attract light bodies to the surface of the crystal. When the crystal is allowed to cool after being heated, the electricity developed at each extremity is the opposite of that manifested during the heating.—In conducting experiments in electricity, a variety of instruments have been introduced in connection with the machine, some of which, as electrometer, electrophorus, electroscope, &c., may properly be noticed in their alphabetical place in this work, though for their full description the reader must look to some of the many able special treatises upon this subject, among which that by Sir David Brewster holds an important rank, and has furnished most of the materials for the many compilations. The *Traité de l'électricité théorique et appliquée* (Paris, 1854–'58) of M. A. De la Rive presents the science most completely in its latest developments, and in its several departments. An English translation of it, by C. V. Walker, F. R. S., entitled "A Treatise on Electricity in Theory and Practice," has been published (3 vols. 8vo., London, 1853–'58). See also Faraday's "Experimental Researches on Electricity" (3 vols. 8vo., London, 1844–'55).

ELECTRO-DYNAMICS (Gr. ἠλεκτρον, amber, and δυναμις, power). The kind of electricity developed by friction may be kept quiescent, as accumulated in the Leyden jar, and at any time be made to manifest instantly its intensity of action, as when a fulminating powder is exploded. But, as developed by chemical action, electricity in the form of a constant current manifests other properties; and its effects are exhibited only during the flow of this current, disappearing instantly on its cessation, as the light of the sun is lost when its rays are intercepted. Electro-dynamics is the name applied to this branch of the science, in contradistinction to electrostatics, the term used to designate the other. The distinction is not, however, a satisfactory one; and when the nature of this subtle agent is more perfectly comprehended, it will no doubt give place to a more exact exposition. But at present the former is the comprehensive term which includes whatever belongs to the electrical current generated by the voltaic pile or battery, the thermo-electric circle or the electro-magnet. Under the heads THERMO-ELECTRICITY, ELECTRO-MAGNETISM, and MAGNETO-ELECTRICITY, the last two will be respectively treated.—The discovery of this form of electricity has been referred to in the article ANIMAL ELECTRICITY. It is manifested in the chemical action of substances upon each other; not often exhibited, it is true, unless sought for, but still manifested, even when it is so feeble that the electrical excitement produced is its only indication; witness the slight shock to the animal tissue, causing sudden contraction, when 2 different metals placed one below and the other above the tongue, or against the inner surface of the lip, are brought in contact at their edges. The saliva in this case acts chemically upon each metal, producing in the one most affected resinous or negative electricity, and in the other vitreous.* The former is analogous to the rubber in the electrical machine, and is called the generating plate; the other, answering to the prime conductor, is called the conducting plate. The greatest effect is produced when (both being good conductors) the one is rapidly acted upon by the fluid which wets them, and the other is of a nature to be less affected. Two such plates are called a galvanic pair; the term element is applied sometimes to the pair, or more generally to one of the plates. They are commonly one of zinc and one of copper, silver, or platinum, and they are immersed in water mixed with sulphuric acid. They are allowed to touch each other only above the surface of the fluid, or instead of directly touching, a wire of any length may proceed from each as a conducting medium, through which the electrical current is transmitted, and its effects are developed with the same energy at their extremities, or the poles of the pairs when brought into contact, as if the upper edges of the 2 plates were themselves brought together. By the contact being effected an extraordinary capacity is produced in the solution of acting upon the zinc plate, while the other appears to be proportionally protected. The water is decomposed, its oxygen unites with the zinc, the resulting oxide of which is dissolved by the sulphuric acid as a sulphate, and the hydrogen appears in minute bubbles on the surface of the other plate. These bubbles continually increase in size and escape to the surface. The electricity is supposed to be generated at the zinc plate or that most acted on by the acid, and to pass through the fluid from this to the copper or metal less affected by the acid, and thence through whatever conductor is interposed between the upper portion of this and that of the zinc plate. The zinc plate, supposed

* A curious instance of this phenomenon is presented by placing a leech upon a silver dollar, and this upon a sheet of moistened zinc. The animal on attempting to crawl off evidently receives a startling shock on touching the zinc, which induces him to draw suddenly back, and thus he is kept a prisoner upon the silver.

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to be the source of the electricity, is called positive, and the copper plate, which receives the current, negative. Some suppose two currents are excited, which pass in opposite directions, and others believe that the excitement is not of the nature of a current at all. If the circuit is complete, no evidence of this action is apparent except the rapid oxidation and disappearance of the zinc, and the production of the hydrogen; but if this be interrupted by the smallest break or by the interposition of a very fine wire, the passing of the current is manifested, not, as with the machine electricity, by the quality of tension which enables it to leap across the non-conducting air, with an explosive spark, or to pierce an interposed card or other poor conductor, but intense heat is developed at the points where the current is partially obstructed. If, however, the number of pairs be greatly multiplied, the electricity then approaches the character of that generated by the friction machines. When a fine wire of a poor conducting metal is used to form a part of the circuit, this is immediately oxidized and disappears in vapor. If the break is closed by bringing the terminating points in contact, brilliant sparks are produced; and if points of coke or dense charcoal, such as that made from boxwood, are used for the poles or electrodes of the circuit, a continuous light of intense brilliancy is emitted, even if the poles terminate in a vacuum, and to some extent also if under water, thus evidencing that it is not the effect of combustion. In the passage of the current through most compound fluids in which the plates are immersed, the fluid is decomposed, one of its elements, as the hydrogen, appearing at the negative, and the other, as the oxygen, at the positive side; and the same decomposition is effected if, instead of immersing the plates in the compound fluid, the conducting wires anywhere on the circuit are each made to terminate in it, but not in contact with each other. In this case, however, it is the wire attached to the copper which is acted upon; and that attached to the zinc (now the negative pole because it receives the current), which gives off the hydrogen. This is the arrangement used for effecting decomposition, and the interposed vessel in which the compound is placed is called the decomposition cell. It is in reference to the phenomena which take place in this, that bodies are distinguished as either electro-negative or electro-positive; or, according to the nomenclature of Prof. Faraday, as anions or cations. The former in the decomposition tend to the anode or positive pole of the battery, that proceeding from the copper plate, and the latter to the cathode or negative pole of the battery. (See CATHODE.) Hydrogen, the alkalies, and the metals, appearing at the negative pole of the battery, are cations; oxygen, chlorine, iodine, fluorine, and the acids generally, tend to the other pole, and are called anions. But this classification of bodies must not be confounded with their division into positive and negative with reference to their action when applied in the battery to excite the electric current. Zinc in this arrangement has been called the electro-positive metal, and copper the electro-negative, terms which have merely a relative signification; for if potassium were substituted for the copper, or platinum for the zinc, the electrical properties of the metals would be found reversed. The following table presents the metals named in the order in which they stand to each other when used for electric plates, with the acid mixtures usually employed, as water with sulphuric or hydrochloric acid. The most positive is the first named, the most negative the last. Each one is positive to those which succeed, and negative to those which precede it. Those furthest separated would consequently produce the highest electric excitement:

1. Potassium.	6. Lead.	10. Silver.
2. Zinc.	7. Copper.	11. Antimony.
3. Cadmium.	8. Bismuth.	12. Gold.
4. Tin.	9. Nickel.	13. Platinum.
5. Iron.		

This arrangement, however, is not constant with all fluids, nor always with the same fluid at different degrees of concentration, or at different temperatures. A number of pairs being arranged in succession, and the zinc plate of one being connected by a good conductor to the copper of the next, and so on, the whole may be made to act as one pair with increased effect. Enlarging the size of the plates also increases the power. Volta's arrangement was a pile of disks of copper and zinc, one of the latter being placed at the bottom, upon it a cloth moistened with some acid liquor, separating it from the copper above, on which rested another zinc disk, then the wet cloth, copper, zinc, and so on, the uppermost disk being one of copper. Two wires, one from each extremity of the series, meeting together, complete the circuit, and electrical action is excited throughout the whole series. On the supposition of there being two currents, the electricity developed by the chemical action of the acid upon the lowest zinc plate renders this positively excited, and the proximate copper negatively so. This, in actual contact with another zinc plate, tends to impart to it directly its own kind of electricity, but this zinc disk also, being itself positively excited, transmits the negative electricity to the next copper with an additional charge of its own creating; and thus the negative current goes on accumulating toward the uppermost copper disk, while the positive electricity accumulates in the same manner in the other direction at the lowest zinc. The conducting wires, like those of the electrical machine, by coming in contact restore the disturbed equilibrium, one electricity neutralizing the other. This original arrangement is called the voltaic pile. It was modified, however, by Volta himself, by the substitution of a liquid for the moistened cloth; and the plates being immersed in this on the same principle of their arrangement in the pile, the apparatus is called the voltaic or galvanic battery, the latter name having reference to Galvani, who discovered this kind of electricity, though he knew nothing of this mode of developing it.—It has been al-

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ready stated that by increasing the number or size of the plates the electrical effects are augmented. It is not a matter of indifference, however, which of these modes is adopted. It is found that increasing the area of a single pair of plates adds to the capacity of generating heat even in a greater ratio than the increase in the surface of the plates, and at the same time magneto-electricity is more thoroughly developed; but the intensity of the electrical force is not sensibly affected, nor its power of producing chemical changes in bodies introduced into the circuit, which is a property belonging to that condition expressed by the term intensity, and not to the other, dependent, it is supposed, on quantity. But if the size of each pair of plates continue the same, and their number be increased, the electricity developed is more of the nature of that generated by the electrical machine, which is distinguished by its character of intensity, as is manifested in its power of giving shocks, and of passing to some extent through imperfect conductors. It is this form of battery which is employed to effect chemical decompositions. That used by Sir Humphry Davy in the experiments which resulted in his discoveries of the metallic bases of the alkalies and earths, consisted of 2,000 pairs of plates, with areas exposed to the action of the acids amounting to 128,000 square inches. Various modes are adopted for arranging these plates, but the principle is the same in all. The copper and zinc plates of each pair are to be brought in contact directly or through the medium of a slip of metal, while the communication between the zinc and copper of adjoining pairs is through the acid liquor in which they are immersed. The arrangement may consist, as in the trough battery, of a number of cells formed by partitions, which neither the acid nor the electric current can traverse, a copper plate being opposed to a zinc plate in each cell, and the communication being from the zinc to the copper through the fluid. The copper is connected by a slip of metal passing over the partition with a zinc plate in the next cell, opposed to which is another copper plate, and so on. The last copper communicates with the first zinc by a wire outside of the whole, thus completing the circuit. Or, instead of a trough divided into cells, a number of glass tumblers may be arranged in succession, each holding a zinc and a copper plate, which are connected by strips of metal with their opposite plates in adjoining tumblers. This was the arrangement adopted by Volta. In Cruikshank's form of the battery, the zinc and copper plates are applied one upon the other and soldered together, and thus inserted as partitions in the trough, the zinc plates all facing one way and the copper the other. The cells thus made being then partially filled with dilute acid, the arrangement is seen to be the same as that of the voltaic pile. Batteries constructed with a few plates of great size develop a vast amount of electricity, but in a current of feeble intensity. Their action can consequently be extended only to short distances, and then through the best conductors; but if the current be interrupted by the interposition of fine wire of poor conducting material, as iron, steel, or platinum, an extraordinary degree of heat is developed. A remarkable battery of this description was first made by Dr. Hare of Philadelphia, with which he fused a number of substances before regarded as infusible, including charcoal; platinum he described as running like water under its action. For convenience of room the plates were arranged in coils, the zinc and copper being separated by a space of only $\frac{1}{4}$ of an inch. From its power of producing heat he called this form of battery a calorimotor. Similar batteries have since been made with an exposed area of 400 square feet. By connecting a number of distinct sheets of the same metal together by a good conductor, the effect is produced of one large sheet. Heat is also developed by increasing the strength of the acid, at least up to a certain point. The chemical action then goes on with greater rapidity, and a proportionate quantity of electricity is set free. The deficiency of this kind of electricity in intensity renders it necessary, when the effect is to be transmitted a considerable distance, as for firing charges under water, or igniting several charges at once in blasting rocks, to add a second battery or to increase the number of the pairs of plates. The best conducting material should be used, and this in a wire of large size. The metals vary greatly in their capacity of conducting the electric current. Their proportional value in this respect is represented in the numbers respectively accompanying those named below:

Silver, copper, each	100	Iron, platinum, each	24
Gold	80	Tin	20
Zinc	40	Lead	18

The place for brass is between copper and gold. In the article BLASTING is a description of a cheap battery used in Scotland, by which discharges have been produced at a distance of 500 feet. A second battery added would carry the effect still further. Cast iron is substituted in this for the copper plate, being found more efficacious for generating electricity in quantity than either copper or silver. The effect of the intense heat is beautifully exhibited by a number of interesting experiments, which should be performed in a dark room. When one wire of the battery is made to terminate along the edge of a metallic coil, and the opposite edge of this is laid upon a metallic surface which is connected with the other wire, the leaf of metal is inflamed, and burns with a characteristic light and color, silver giving out a bright green, and gold a whitish light. If one wire is made to terminate in a file and the other in a steel point, and the point is drawn over the file, brilliant sparks are emitted like those struck by the hammer of the blacksmith from a mass of heated iron.—Dr. Wollaston effected an important improvement in the battery in 1815, by causing each face of the zinc to be op-

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posed to one of copper. The plate of the latter metal was bent round in the form of the letter U, and from the upper edge of one side an ear projected at right angles, by which it could be suspended to a cross bar of baked wood. The screw bolt which fastened it to the wood also went through a similar ear projecting in the opposite direction from the zinc plate of the next pair, the copper ear lying between the wood and the zinc ear, and both being brought into close contact by tightening the nut on the upper surface of the bar. The zinc plates lie each within one of bent copper, but without touching it in any part. Their contact is sometimes guarded against by inserting strips of baked wood between the two metals. As by this arrangement particles of zinc as they fell were caught in the bend and retarded the action of the battery, the form was afterward improved by inverting the copper plate and cutting out a portion of the top, so as to admit the bar forming the ear of the zinc plate. The slip of copper cut out was also bent to one side, to take the place of the copper ear of the former arrangement, and connect with the next zinc plate. There were, however, still other defects of serious consequence attending the operation of the battery in all these forms. The surface of the copper was diminished by the bubbles of hydrogen which collected and adhered to it. The capacity of the water to take up the sulphate of zinc diminished with the quantity dissolved, and the chemical action thus constantly grew weaker. The action of the copper was also lessened by the collection of a film of black oxide and of other impurities, and by the reduction to a metallic state of a portion of the sulphate of zinc, the latter causing local and contrary currents of electricity. These defects were corrected in the battery of Prof. Daniell, of which an account was published in 1836. The zinc in this was separated from the copper by being suspended in a porous cell, which contained the diluted acid; and this porous cell was placed in an outer vessel of cylindrical form made of copper, which acted as the negative plate, and contained a solution of sulphate of copper with an addition of about $\frac{1}{12}$ of sulphuric acid in excess. The zinc was a cylindrical rod, and the cell originally used was the gullet of an ox. In this arrangement the animal membrane admits the passage of the electric current, but checks that of the sulphate of zinc. The hydrogen, too, no longer collects upon the copper, but spends itself in decomposing the sulphate of this metal, uniting with the oxygen of the oxide, and setting the copper free. The sulphuric acid eliminated at the same time penetrates to the zinc, keeping up the strength of the mixture in the porous cell. The copper resulting from the decomposition of the salt of the metal is found to cohere upon the surface of the negative plate; and this is the principle upon which the art of electro-metallurgy is based. By keeping up a supply of crystals of sulphate of copper where they can be dissolved as required in the upper part of the solution, the battery may be kept in action for days together. For this reason it is called the "constant battery." Its effect is increased by adding several pairs, and connecting them on the principle adopted in other batteries. Grove's battery is constructed on the principle of Daniell's, but is made much more compact by the use of platinum instead of copper. A strip of this is placed in the porous cell, which in this case is of unglazed porcelain, and contains strong nitric acid. The zinc, in the form of an open cylinder with a longitudinal slit from top to bottom for admitting the free circulation of the acid through it, is placed outside of and around the porous cell in a glass tumbler or similar vessel, partially filled with sulphuric acid diluted with 10 parts of water. The poles are thus seen to be reversed from the arrangement of Daniell's. This battery is remarkable for its intensity or power of current, but is objectionable on account of the fumes of nitrous acid generated by the reaction of the hydrogen upon the nitric acid, the gas developed at the zinc penetrating the porous cell in its progress toward the negative plate. Bunsen's battery differs from Grove's in the substitution of a cylinder of a dense form of carbon for the platinum. The coke which adheres to gas retorts answers an excellent purpose. The form of a hollow cylinder may be given to the coke by preparing it from pounded coal, and it may then be used for the porous cell by filling it with nitric acid and sand. Outside of it the zinc cylinder is placed in dilute sulphuric acid. The coke is improved by soaking it in a saturated solution of sugar and calcining it a second time. Smee's battery, like the trough battery, employs but one fluid. Its peculiarity originally consisted in the use of a negative plate with a rough surface, this having the property of shedding the hydrogen bubbles as fast as they form. The metal employed was silver coated with platinum deposited upon it in a pulverulent form. Platinum foil is sometimes used instead of silver, and the name is retained with the method of arranging the plates. A strip of the platinum is suspended with two zinc plates, one on each side of it, from a wooden bar extended across the top of a tumbler or similar vessel. The plates are kept very close to each other and exactly parallel. The two zinc plates are connected together by a clamp passing over the wooden bar, and the conductor from the platinum plate passes through the top of the bar. By keeping the plates in close proximity the electric current is rapidly excited, but it is necessary to prevent the platinum foil from being brought into connection with either zinc plate below the surface of the fluid, as may happen from the accumulation of hydrogen bubbles upon it, or from its being drawn by any other cause to one side. This may be effected by glass beads attached to its lower edge, or by its being kept in place by a weight or other means. In all these arrangements it is found that the consumption of the zinc may be greatly reduced by the application of mercury to its sur-

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face, so as to form an amalgam over both faces. The metal is not then subject to dissolve in the diluted acid when the circuit is not complete; but whenever the action of the battery is required, and the communication is formed between the plates, the zinc is attacked by the acid the same as if no application of mercury had been made to its surface. The zinc is amalgamated by rubbing it with mercury after it has been cleaned with diluted sulphuric acid. It is recommended by some to mix the diluted acid and mercury together in a vial, and then apply the mixture.—The presence of a fluid is not essential to produce voltaic electricity. What is called the electric column or dry pile, first made by Behrens in 1805, and improved and brought into notice by De Luc in 1810, is constructed of disks of zinc, copper, and gilt paper, called Dutch paper; it may be less than an inch in diameter. With a column of many hundred groups piled upon one another a vibration of a brass ball suspended by a silk thread has been continued between two bells insulated and connected one with each pole of the column so as to keep a continual ringing for nearly 6 months. De Luc caused a pendulum thus to vibrate without stopping for more than 2 years. With an apparatus of 20,000 groups of silver, zinc, and double disks of writing paper, Mr. Singer obtained minute bright sparks, and charged a Leyden jar in 10 minutes with sufficient electricity to cause a disagreeable shock, to perforate thick drawing paper, and to fuse one inch of platinum wire $\frac{1}{3300}$ of an inch in diameter. The quality of the electricity was wholly that of the machine, and not that ordinarily developed by the pile. In 1812 Prof. Zamboni of Verona produced a modified form of this pile, using 2,000 disks of silver paper. Each uncoated side was covered with a layer of black oxide of manganese and honey. The outside of the column was coated with shell lac, and the whole was enclosed in a hollow brass cylinder. Between two of these columns a balanced needle was found to vibrate continuously; and attempts were made in Germany and England to apply this as a motive power for clocks and watches, but the movement was found to be too irregular to admit of this application. De la Rive recommends as a lasting form of this apparatus disks of Dutch gold and of Dutch silver paper stuck together back to back, and arranged so that a silver face lies upon each gold face, the paper separating the metallic faces of each pair. A very fine silk cord impregnated with varnish serves to secure the disks together, and the column is placed in a tube of varnished glass and supported between rods of the same. The lowermost disk is placed upon a metallic surface, and a metallic screen terminating in a ball is made to press upon the uppermost. Disks of zinc alone, one side polished and the other rough, also make a voltaic pile, similar faces being presented the same way, and separated as they are arranged in a trough only about $\frac{1}{50}$ of an inch from the opposing polished face of the next plate. The interposed air serves as the moist conductor, and electricity is developed sensibly with the use of 60 to 80 plates, the polished face acting as the positive and the rough as the negative element. Although two metals are usually employed for generating voltaic electricity, one alone may answer, provided that different portions of it are in conditions to be differently acted on by the acid. The electrical excitement is produced with a single plate formed in part of cast and in part of rolled zinc; or if one portion of a plate of copper or of zinc is corroded and the other is clean, a current is produced, the surface most readily acted on being the generating plate. Prof. Faraday also shows that a plate presenting a uniform surface may be made to develop electrical excitement when different portions of it are exposed to the action of two fluids which differently affect it. Thus an electric current is produced when a plate of zinc, iron, or copper is put into a vessel which has been partially filled with a strong solution of sulphate of copper, and upon this a layer of dilute sulphuric acid has been carefully added. The sulphate of copper in solution will be decomposed, and metallic copper will be precipitated upon the portion of the plate in contact with it.—The presence of a current of voltaic electricity is indicated by instruments called galvanoscopes or galvanometers, the principle of which is the tendency of a magnetic needle to turn from its north and south direction when the electric current is sent through a copper wire, which passes over and under the needle in one or a number of turns. (See ELECTRO-MAGNETISM.) The more numerous the turns, provided the wire is of size proportional to the quantity of electricity, the more sensibly is the needle affected; and in order that the wire may be compactly arranged, so as not to transmit the current through its side to the adjoining layers, it is insulated by being wound around with silk. The needle deviates to one or the other side according to the direction in which the current is transmitted, or according to which end of the wire is connected with the positive or negative pole of the battery. By connecting a graduated circle with the needle, the amount of deviation may be made to measure the power of the electric current, and the instrument is then a galvanometer. Prof. Faraday applied another principle to the measurement of the electricity by ascertaining the quantity of water decomposed by the electric current. This he did by measuring the hydrogen and oxygen evolved, which he collected in a graduated glass tube, used as a bell glass for collecting gases. The wires of the battery ending in two platinum electrodes were introduced through the opposite sides of the tube near the bottom, and brought nearly in contact. The tube, filled with water, or water acidulated with sulphuric acid, was inverted over a receptacle of the same fluid, and as the gases collected in the upper part the liquid was displaced. The surface of this should

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not be allowed to descend below the ends of the wires, as the heat then developed might cause an explosion of the gases. This apparatus was named by Prof. Faraday a voltameter. It has been modified by using two tubes set in a large cork side by side, and opening below into the vessel containing the fluid. The wires are made to terminate near each other, one under the mouth of each tube. Into the tube over the positive wire oxygen only is evolved, while the other receives only hydrogen in quantity double that of the oxygen. Other forms of voltameters have also been devised, the principle of which was the determination of the amount of heat developed. This was estimated by its effect in causing the elongation of a wire of platinum, or in causing narrow slips of metal laid up together to twist still more or to untwist by their unequal expansion or contraction.

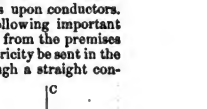
ELECTRO-MAGNETISM AND MAGNETO-ELECTRICITY are branches of science which treat of the phenomena belonging to both electricity and magnetism. In our article on electricity we have given an exposition of the facts of this branch of science, independent of any hypothesis as to the causes of the phenomena; but our account would be incomplete, and it would be almost impossible to present a proper view of the branches above mentioned in the space to which we are limited, were we not to give some idea of the generalizations which have been invented to explain the phenomena, and to express the laws of their mutual connection and dependence. It must be recollected that science does not consist in an accumulation of facts, but in a knowledge of principles, and it is impossible to arrive at a full comprehension of these principles without expressing them by means of some hypothesis from which logical deductions can be made, which will enable us at any time, independently of mere memory, to say what result will be produced when the conditions are known, or in other words, which will not only present to us the relations of known phenomena, but enable us also to predict the occurrence of those which have not been observed. Without hypotheses of this kind no extended and definite progress can be made in science. It should, however, always be borne in mind that they are the provisional expressions of the generalizations of our knowledge at a given time, and that we must hold ourselves in readiness to modify or even abandon them, when we meet with facts with which they are decidedly inconsistent. Two hypotheses have been proposed to account for the phenomena of electricity: one, that of Du Fay, known by the name of the theory of two fluids, and the other by that of the Franklinian, of one fluid. According to the first, all bodies are pervaded by two elastic fluids, the atoms of each repelling those of the same kind and attracting those of the opposite kind. When the two fluids are together in equal quantities in the same body, they neutralize each other; but when separated by friction or other means, their attractions and repulsions are manifested by various electrical phenomena. The second hypothesis supposes that all the electrical phenomena are produced by the disturbance of one highly elastic fluid, which pervades the earth and all material bodies, and which is able to move with various degrees of facility or not at all through the pores of substances of different kinds of gross matter, which are hence considered either conductors or non-conductors; that the atoms of this fluid repel each other with a force varying inversely as the square of the distance; that the atoms of the same fluid attract the atoms of gross matter, or some ingredients in it, with a force varying in accordance with the same law; that the atoms of gross matter devoid of electricity tend to repel each other with a force inversely as the square of the distance. When any body has so much electricity combined with it that the self-repulsion of its atoms is just balanced by the attraction of the same atoms for the unsaturated matter, then the body is said to be in its natural state. So long therefore as all portions of space contain their natural share of the fluid, no electrical phenomena are exhibited; but if, by means of friction, chemical action, heat, and other agencies, together with the interposition of partial or non-conducting substances, the electricity is accumulated in one portion of space, and rendered to the same amount deficient in another, then two classes of phenomena are manifested: 1, those called statical, such as induction and the consequent attraction and repulsion of light bodies, due merely to the accumulation or deficiency of the fluid; 2, dynamical, or those which arise from the transfer of the fluid from the place where it is redundant to that where it is in deficiency. Our countryman, Franklin, is justly celebrated for his discoveries in science, but his claims to philosophic genius rest particularly upon his conception of this theory of electricity, which bears his name, and which, with slight modifications and additions, is still sufficient to express the connection and relation of the multiplicity of facts which have been discovered since his day. However different the two theories at first sight may appear, their mathematical expression and the deductions from them do not differ, provided that we adopt the modification of the latter proposed by Æpinus and Cavendish, that matter devoid of electricity repels matter; an assumption not inconsistent with the attraction of gravitation and chemical action, since we may refer even these to the same cause. The theory of Du Fay was generally adopted by German and French savants, because it was first discussed by them in a mathematical form. The theory of Franklin was afterward developed mathematically, and with the modifications we have mentioned, is, we think, more readily applicable to the facts of the present state of the science than the other. It follows from the theory of Franklin that if electricity be communicated to a sphere of conducting matter, all the fluid will be found at the sur-

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face, because each atom repels the other, and the state of equilibrium will be that of an equal distribution at the circumference; the atoms are prevented from flying into space by the non-conducting medium of air in which the globe exists. In like manner it follows from an application of the law of attraction inversely as the square of the distance, that when a body has less than its natural share of electricity the deficiency must exist at the surface. In charged conductors of elongated forms, the distribution of the fluid will be greater at the two extremities. The phenomena of the Leyden jar are readily deduced, and all the facts connected with it may be anticipated even with numerical exactness, by the application of this theory. When a redundancy of electricity is thrown on one side of a pane of glass, the repulsion acting through the glass will drive off a portion of the natural electricity on the other side, the unsaturated matter of which will attract the free electricity thrown on the first side and thus neutralize its repulsive energy; and in this way an immense amount of electricity can be accumulated in a small space. When the two surfaces are joined by a conducting circuit a discharge takes place with great intensity, because the fluid on the charged side is impelled through the circuit by the repulsion of its own atoms, and because it is attracted to the other side by the unsaturated matter. If an insulated conductor in the form of a long cylinder with round ends be brought near a charged conductor, but not within striking distance, the natural electricity of the former will be repelled to the further end; the end nearer the charged body will be in a state of deficiency of electricity or negatively electrified, while the further end will be in a state of redundancy or positively electrified. Between the two ends there will be a point which will be neutral or in its natural state. The intensity of this action diminishes rapidly with the distance, particularly in the case where the cylindrical conductor is short and the excited body is small; but in the case of atmospherical electricity, in which the charge is on the surface of a large cloud, the inductive action takes place through several miles of intervening space. An attempt was made by Æpinus, Poisson, and others, to apply the same hypothesis to the phenomena of magnetism. Between these and those of electricity a striking analogy was observed. For example, bodies which are dissimilarly electrified attract each other; those which are similarly electrified repel each other. In like manner, two similar poles of a magnet repel, and two dissimilar poles attract each other. Again, if the north pole of a magnet be brought near an unmagnetized bar of soft iron, the near end exhibits southern polarity and the further end northern polarity, apparently similar to the result of the action in the example we have just given of electrical induction. There is however this remarkable difference, that if we magnetize a piece of hardened steel in the same way by the induction o. a powerful magnet, and afterward break the bar into two pieces, each half will exhibit a north and south pole of equal intensity; and if we continue to break each piece into two others, however far the division may be continued, the same result will be produced, namely, a pole at each end of each piece and a neutral point in the middle. From this experiment we infer that the polarity of magnetism results from the development of the magnetic power in each atom of the mass; while if the same experiment be made with an electrical conductor, that is, if it be separated into two parts while under the influence of the excited body, each half will exhibit a charge of only one kind of electricity. By considering therefore that electrical conduction produced by a bodily transfer of the fluid from one end of the conductor to the other, and limiting the disturbance in magnetism to the particles of gross matter, a mathematical expression of most of the phenomena known previous to the discovery of Oersted was obtained. Still electricity and magnetism were so dissimilar in some particulars that they continued to be studied as distinct branches of science. The fact had long been noticed that discharges of lightning frequently gave polarity to bars of steel, and in some cases reversed the mariner's compass. A series of experiments to imitate these effects were made by Franklin and others by passing shocks through darning needles. The results were unsatisfactory, since the needle was sometimes magnetized in one direction and sometimes in the other, and frequently not at all, without any apparent change in the conditions. Indeed, ordinary electricity was not favorable to the study of the connection of electricity and magnetism, since the phenomena which belong to both are exhibited during the continuance of an electrical current; and in the case of the discharge of a Leyden jar the transfer is so instantaneous that we are only able to study effects which have taken place, without being able to make any observations as to the manner in which these results have been produced. This was the condition of the science up to the winter of 1819–'20, when Prof. Oersted of Copenhagen put a new interrogation to nature by asking what would take place in regard to a magnetic needle when the two poles of a galvanic battery were joined together by a conducting wire. He found that when the wire was brought parallel to and near the needle, the latter tended to turn at right angles to the former. This was a new result, unlike any phenomenon before discovered. Previous to this, the connection between electricity and magnetism had been sought in the analogy of the polarity of the two ends of a magnetic bar and the two extremities of a galvanic battery, both of which exhibited polarity. An account of this remarkable discovery was published in all parts of the civilized world, and everywhere excited the interest of men of science. It was repeated in England, France, and Germany. The additional fact was discovered

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by Arago in France and Davy in England, that the wire joining the two poles of a galvanic battery while the latter was in action was capable of imparting magnetism to iron filings; but the person who seized on the phenomenon with the greatest avidity, and who in the course of a few months developed the whole subject to such an extent as to elevate it to the rank of a new science, was Ampère, of the French academy. He discovered an additional fact which gave a key to all that had previously been found by his contemporaries, namely, that two parallel wires transmitting currents of electricity in the same direction attract each other, while similar wires transmitting currents moving in opposite directions repel each other. On this fact, combined with the hypothesis that all magnetic action consists in the attraction or repulsion of electrical currents, he founded his celebrated theory of electro-magnetism, which gives in a single sentence a generalization from which all the known phenomena of electro-magnetism as well as ordinary magnetism can be deduced. This theory is based upon one fact and one hypothesis. The fact is this, that currents moving in the same direction attract, and moving in opposite directions repel, each other; the hypothesis is, that the magnetism of a bar of steel consists in currents of electricity revolving at right angles to the length of the bar around each particle of the metal. In order to give as much precision to our ideas as is possible without the use of diagrams, let us suppose a number of shillings or cents piled one on the other, and cemented together so as to form a cylindrical column or rod 8 or 10 inches in height; and let us further suppose that on account of some molecular action a current of electricity is perpetually circulating in the circumference of each piece of coin, and that the direction of the currents is the same in the whole series. If we further suppose that the column is standing on end, and that this motion is contrary to that of the sun and contrary to that of the hands of a watch when placed face upward, such arrangement will represent the hypothetical magnet of Ampère, in which the north end, or that which turns to the north, is uppermost, and consequently the south pole undermost. If these postulates be granted, instead of loading the memory with an almost infinite variety of disconnected facts, we shall have at once a generalization from which all the phenomena can be deduced at pleasure in a series of logical corollaries. If this theory be true, or if it be even an approximation to the truth, it will follow that if currents of electricity be transmitted through an arrangement of the kind we have described, the phenomena of ordinary magnetism will be exhibited; and this anticipation will be realized if we coil a piece of copper wire covered with silk into the form of a corkscrew spiral, forming a cylinder 8 or 10 inches long, and if the two projecting ends not included in the spiral be passed backward through the cylinder and made to project from the middle at right angles to the length of the cylinder on opposite sides. If this cylinder, the several spires of which will represent the pieces of money, be supported horizontally, so as to turn freely as a magnetic needle moves on its pivot, it will take a north and south position when a powerful current of galvanism is transmitted through the wire. Nay, more, another cylinder formed of like spires through which a current of galvanism is passing will act upon the first precisely as a magnet would act upon another magnet. Indeed, so long as the galvanic current is passing through this helix or spiral, it exhibits all the properties of an ordinary magnet; but they immediately disappear when the current is interrupted. To deduce from his theory the almost infinite number of facts which it involves, Ampère first considered the action of currents on currents. Starting with the hypothesis that the attraction and repulsion were inversely as the square of the distance between the elementary parts or smallest portion of the currents, he deduced mathematically the consequence that the force of a current of considerable length acting on a single element of a current would vary inversely as the simple distance; and this he was enabled to verify by experiment by suspending a bent wire, through which a current was passing so as to be free to oscillate under the influence of a single element, which was ingeniously effected by doubling a piece of covered wire in the middle of its length, thus >. When a current was passed through this double wire, the portion of it which went to the point of bending and that which came from it neutralized each other, and the residuary effect therefore was that of a single point, which gave a result exactly in conformity to the deduction from the theory. After proving experimentally this fundamental principle, he was enabled by mathematical reasoning, principally of a simple character, to deduce the resultant action of the most complex forms of conductors upon conductors. Among many others, the following important deductions immediately flow from the premises assumed. If a current of electricity be sent in the direction from A to B through a straight conductor, A B, of indefinite length, placed for example horizontally, and a current be sent downward through a terminated conductor, C D, perpendicular to the former, the latter conductor will be impelled parallel to itself along the length of the horizontal conductor. This effect will be due to the fact that on the right side of the short conductor the elements of the two currents are moving in opposite directions; the current in the short wire is approaching the point F, while the current in the horizontal wire is moving from this same point, and hence on this side repulsion will take place; while on the left hand side of the short wire the two currents are moving toward the same point, and therefore attraction will be exhibited; and under the influence of these two forces, the



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short conductor will move parallel to itself from right to left along the horizontal conductor. If the direction of the current in either of the two conductors be reversed, the motion of the short conductor will also be reversed. If, instead of the short conductor, one in the form of a ring be freely suspended over the long conductor, with the plane of the latter across the former, the current passed through this will ascend on one side of the ring and descend on the other. Therefore, the one side will tend to move to the right and the other to the left, and the resultant action will be to bring the plane of the ring parallel to the horizontal current; in which case the current in the lower part of the ring will be moving in the same direction as the current in the long wire. Now, since, according to the theory of Ampère, magnetism depends upon currents of electricity, it follows that the magnetism of the earth results from currents of electricity revolving continually from east to west. Hence, if a conductor be bent into the form of a ring or hoop, and freely suspended, it will arrange itself east and west. To insure the success of this experiment, the hoop should be formed of a long wire covered with silk and coiled into the form of a ring so as to multiply the actions. Such a ring may be considered as one of the disks represented by the shillings in the hypothetical magnet; and since each disk making up the whole length of the rod would be similarly acted upon by the currents of the earth, the axis of the rod would assume a north and south direction if left free to move, thus affording an explanation of the fact, so long considered an ultimate one, of the directive property of the needle. Let us return again to the action of the long horizontal conductor on the short perpendicular one. If the former be bent into a horizontal circle, then it is evident, from the reasons we have before given, that the short conductor, moving perpetually round it parallel to itself or retaining its perpendicular position, will describe a circle. This may be shown experimentally by bending a piece of wire into the form of an Π, and supporting it vertically on the point of a perpendicular wire which fits lightly into a socket on the under side of the middle of the arch. If the two ends of this bent wire dip into a circular basin of mercury through the middle of which, surrounded by a glass tube, the supporting pointed wire passes, and if a powerful current of galvanism be sent up through this wire, it will descend through the legs of the Π into the mercury; and if at the same time a powerful current be passed through a ring or hoop conductor placed horizontally around it, a rapid rotation of the Π-formed wire will take place. Now since magnetism, according to the theory we have adopted, consists in currents of electricity revolving at right angles to the magnet, if a magnetized bar be introduced within the branches of the bent conductor, a similar rotary motion will ensue. This fact was first shown experimentally by Mr. Faraday. It is, however, a logical consequence of the theory of Ampère, and might have been deduced from it. A beautiful illustration of the phenomena of terrestrial magnetism was first exhibited by Prof. Barlow of Woolwich, England. He prepared a wooden globe, into the surface of which a long conductor was buried in a spiral groove extending with many turns from pole to pole. This globe was afterward covered with paper, on which were drawn the continents and oceans. When a small dipping needle was placed over this apparatus and a current of galvanism sent through the concealed conductor, the needle assumed a direction similar to that which would be due to an analogous position on the earth's surface; and since, in all cases, the needle tends to arrange itself at right angles with the direction of the current, by a proper adjustment of the conducting wire in the groove the variation of the needle at every point of the earth's surface could be accurately represented. The explanation of all the phenomena of ordinary magnetism readily flows from the same principles. We have stated that if a magnet be broken in two, each half becomes a separate magnet, exhibiting north and south polarity. If the hypothetical magnet which we have illustrated by a pile of shillings be broken in the same way, each part will become a separate magnet; the two ends of the two parts which were previously in contact will attract each other, because the currents will be revolving in the same direction, but if we turn the other end of one magnet to the same end of the other, repulsion will ensue, because the currents are revolving in different directions. By a little reflection it will not be difficult to explain or to anticipate the action of the two magnets on each other under any assumed condition. In adopting this hypothesis, it is not necessary to contend for the actual existence of electrical currents in the magnet or even in the earth. It is sufficient to assert that all the peculiarities of the known phenomena of magnetism are precisely such as would result from an assemblage of currents such as Ampère has supposed to exist. It is probable that in the phenomena of magnetism a molecular distribution of the fluid takes place which is analogous to that in a wire transmitting a current. Indeed, we know that at the moment of magnetizing a bar of iron, a molecular change is produced in the metal of sufficient intensity to cause a sensible sound; a fact which was first noticed by Prof. Charles G. Page of Washington.—It is an interesting fact in the history of science, that discoveries in one branch serve to throw light on other branches, and in many cases to furnish instruments by which actions too delicate to be appreciated by ordinary means may be exhibited and measured. Soon after the discovery of Oersted, Prof. Schweigger of Germany covered a long wire with silk and coiled it into the form of a rectangle, within which he suspended by means of a fibre of silk a magnetic needle. When a very feeble current of electricity was sent through this conductor, each turn of the

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wire acted on the needle to turn it at right angles to its own direction; and in this way an instrument called the galvanometer was produced, by which the most feeble galvanic action in the form of a current is exhibited. It has been before stated that Arago and Davy discovered that the conducting wire through which a galvanic current is flowing is capable of inducing magnetism in iron filings. They also showed that a discharge of ordinary electricity, when made above or below a sewing needle, gave it definite polarity; and in this way the reason of the failure of Franklin and others, who had attempted to magnetize steel wire by ordinary electricity, was explained. In these attempts the electricity was sent through the length of the needle, instead of across or around it, as the theory of Ampère would indicate. Mr. Sturgeon, in England, was the first to construct an electro-magnet, which consisted of a piece of iron wire bent in the form of a horse-shoe, insulated with a coating of sealing wax, over which was loosely coiled a few feet of copper wire. When the current was sent through the latter, the iron became magnetic, and exhibited in proportion to its size a very intense action. The first person, however, who exhibited the great power of the galvanic current in producing magnetic effects was Prof. Henry of Washington. He found that by surrounding a large bar of iron bent into the form of a horse-shoe by a number of coils of wire, so connected with the battery of a single element that the current in each wire would move in the same direction, a magnetic power of astonishing magnitude could be produced with a comparatively small galvanic apparatus. A magnet constructed on this principle, now in the cabinet of the college of New Jersey, will readily support 3,500 lbs. In order, however, to produce a maximum effect of this kind, it is necessary that great care be taken in the insulation of the wires, that there be no cutting across from one wire to another; and for this purpose the ends of two wires intended to be soldered to the positive pole of the battery should project together, while the two ends intended to be united to the negative pole of the battery should also be associated. If the magnetic power of the iron is to be developed by means of a compound battery, then a single long wire may be employed instead of a number of short ones. The power of the electro-magnet depends on the following conditions: on the energy of the current, the dimensions and form of the iron, the nature of the iron—the softer the better—the perfect insulation of the wire, and the proper adjustment of the length of the wire to the intensity of the battery. By means of an electro-magnet of the kind we have mentioned, the instantaneous development of an immense magnetic power is produced, by which discoveries have been made in regard to this mysterious agent, of the highest interest. Prof. Faraday has shown by the application of this instrument, that magnetic property is possessed by all bodies, either in the form in which it is ordinarily developed, *i. e.* in the direction of the greatest length of the body, or at right angles to this length. He finds, for example, when different substances are made into bars and suspended by means of a fibre of silk between the poles of a powerful electro-magnet, that they arrange themselves with the longer axis in the direction of the pole or with the shorter axis in the same direction. Bodies of the former class are called magnetic, those of the latter class are called diamagnetic. This property is even possessed by gases. (See DIAMAGNETISM.) An electro-magnet even of immense power can be magnetized, unmagnetized, and remagnetized in an opposite direction, by instantaneous changes in the direction of the current of the galvanic battery. The large magnet we have mentioned as at Princeton can be loaded with several hundred pounds, and while in this condition may be so rapidly unmagnetized and remagnetized with the opposite polarity that the weight has not time to commence its fall before it is arrested by the attraction of the reverse magnetism. This sudden change of polarity affords a means of producing mechanical movements of considerable power through the agency of electro-magnetism, which have by some been considered as a rival to steam power. The first machine moved by this power was invented by Prof. Henry immediately after his experiments in developing electro-magnetism, and an account of it was published in the "American Journal of Science" in 1831. It consisted of an oscillating iron beam surrounded by a conductor of insulated copper wire. A current of electricity was sent through this in one direction, which caused one end to be repelled upward and the other attracted downward by two stationary magnets. The downward motion of the one end of the beam near its lowest point brought the conducting wires in contact with the opposite poles of the battery, which produced the reverse motion, and so on continually. In a subsequent arrangement, the velocity of motion was regulated by a fly wheel, and electro-magnets substituted for the permanent magnets at first used. Prof. Ritchie of the London university afterward produced a rapid rotatory motion between the two legs of an inverted horse-shoe magnet in a piece of iron around which a current of electricity was made to revolve, and the magnetism reversed at each semi-revolution. Modifications of these two forms of the apparatus have since been made in almost every part of the civilized world. A large electro-magnetic engine was constructed by Prof. Jacobi of St. Petersburg by which a small boat was propelled at the rate of several miles an hour. But the largest and most efficient engine of this kind was constructed by Prof. Page of Washington, at the expense of the U. S. government. It exhibited sufficient power to propel with considerable velocity a railway car, and afforded the best means which has yet been presented of estimating the comparative cost of the application of electricity as a motive power. From all the experiments which have

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been made, it appears that though the electro-magnetic power can be applied with less loss in the way of effective work than heat by means of the steam engine, yet the cost of the material by which it is generated is so great that it cannot be economically employed. According to the experiments of Despretz, one pound of coal in burning develops as much heat as 6 pounds of zinc; consequently, under the same conditions, 6 times as much power is developed from the burning of an equal weight of the former as from that of the latter. Now the power of the steam engine is produced by the burning of coal in air, while that of the electro-magnetic engine is developed from the oxidation or burning of zinc in acid; and since coal and air are the simple products of nature, while zinc and acid require artificial preparation at the expense of power, it must be evident from all these considerations that electro-magnetism cannot compete with steam, although it may be applied in some cases where the expense of materials is of secondary consideration. Electro-magnetism, for example, is applied with much success in calling into operation power at a distance, as in the case of the electro-magnetic telegraph, in giving simultaneous motion to the hands of clocks situated in different parts of a city, in measuring very minute portions of time, and in bringing into action the power necessary to ring alarm bells.—For an exposition of the scientific principles of electro-magnetism, we would refer to De Montferrand's work on the subject, translated from the French by Prof. Cumming of Cambridge, England; and for various ingenious modifications of apparatus, and interesting facts of the science, to Dr. Page's papers in the "American Journal of Science and Art." (See MAGNETISM, and MAGNETO-ELECTRICITY.)

ELECTRO-METALLURGY, ELECTROTYPING, called by the French *galvanoplastie*, the art of separating the metals from their solutions and depositing them in solid form by means of the electric current, excited by the voltaic battery or magneto-electric machine. The object is to obtain in a metallic layer an exact copy of any surface, as of the impression made in wax of an engraving, a page of type, a medal, coin, &c., the filling of which impression in metal produces a duplicate of the original article, or may itself be used as a mould for obtaining in more fusible metal casts of the same. The metal may also be precipitated so as to adhere permanently upon the surface of objects, either for the purpose of ornamenting, strengthening, or protecting from different agents of change. This branch of the art is called electro-plating and electro-gilding. The discovery that metals might be thus deposited soon followed that of the voltaic pile. Wollaston coated silver with copper by this method in 1801, and Brugnatelli described in 1805 his gilding 2 silver medals in the same manner; but it was not until Mr. Thomas Spencer of Liverpool made his experiments in 1837, that any practical importance was attached to the operation. He had observed that a copper coin used as the negative plate of the battery became incrusted with a layer of copper derived from the solution of blue vitriol in which it was immersed, and that every mark upon the coin was transferred in reverse upon the new layer. But when at another time a slip of the same metal, which he used for the negative plate, happened to be protected by a few drops of varnish from receiving the metallic deposit, it occurred to him that a plate might be thus entirely covered, and any design be cut through the varnish, and the copper be deposited only on the lines thus exposed. He succeeded on trying the experiment, the copper plate being immersed in a saturated solution of sulphate of copper, and connected by a wire with a bar of zinc, which was placed in a dilute solution of sulphate of soda. This was contained in a large glass tube, which (its lower extremity being closed with a porous stopper of plaster of Paris) was introduced into the sulphate of copper solution. About the same time Prof. Jacobi of St. Petersburg was conducting a similar class of original experiments, an account of which, presenting similar results, was published in England in 1839. This drew forth a letter from Mr. J. C. Jordan, a printer, which was published in the "Mechanics' Magazine" of June, describing his method of obtaining impressions from engraved plates, matrices from types, &c., and suggesting other applications of the same process, as obtaining casts from a plaster surface, and even of making metallic tubes by precipitating a metal around a wire, and then dissolving this out by heat or some solvent which has no action upon the outer coating. With such an introduction the art was soon taken up by practical men, and rapidly perfected, so that it is now extensively applied to minister in a great variety of ways to the wants of mankind. The apparatus originally employed is distinguished as the simple form of the decomposing battery, in which the electric current is generated in the same vessel wherein the metal is deposited. It was improved by substituting for the inner vessel of glass one of unglazed porcelain or earthenware, which stands in the centre of the outer cylindrical vessel, and contains in the sulphuric acid diluted with 12 or 15 times its weight of water, the zinc plate suspended by a brass wire and soldered to it, the wire curving over and sustaining at its other end the object to be coated, which is hung face to face with the zinc plate. Neither the zinc within the porous cylinder nor the object without quite touches its walls. As the zinc is dissolved, about the same amount of copper is separated and deposited upon the electro-negative pole. It tends to gather most near the point where the wire is attached to the object, and therefore we should have several of these points of attachment, and all the conductors should be themselves protected by a coating of varnish, as also those portions of the object which it is not designed to cover with the

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precipitated metal. As the sulphate of copper solution would soon be reduced in strength, it is well to keep a bag of crystals of this salt suspended in the upper part of the solution, the lower portion always retaining more strength than the upper. A convenient substitute for this arrangement is to take a tight wooden box or trough, and divide it by a partition of some porous material, as a thin board of sycamore, into two parts, in one of which the copper solution is placed, and in the other about the same quantity of a solution of sal ammoniac, with free crystals of the salt to supply the waste caused by the action of the zinc. A plate of this metal is suspended by wires soldered to its edge and passing over a stick laid across the top of the box, and so adjusted that the plate shall face the diaphragm or partition and be very close to it. The object to be coated is suspended upon another stick parallel to the first by the same wires passing over it. The apparatus should be left several days for the operation to go on; but there is no objection to taking out the plates occasionally to observe how it proceeds. In electro-plating, constant motion is recommended to insure uniformity of deposition. The probability of obtaining a deposit of equal thickness is increased by having the surfaces of the two plates perfectly parallel to each other, and of about the same size and shape. The tendency is for the most prominent points to receive the greatest thickness of metal. The object of the partition is to keep the two salts apart while the electric current may pass freely through the diaphragm. The zinc salt generated in the process is also prevented by it from going to the negative plate and incrusting this with the reduced metal, as it is disposed to do when only one vessel is used, thus checking the operation or interfering with the production of a perfect mould. Cohesion of the precipitate is prevented by a previous application to the object of a thin layer of some greasy substance, and then removing all that can be taken up with a fine linen rag. A much better method has been devised in this country of first applying a coating of silver, and then washing this with an alcoholic tincture of iodine. This prevents cohesion of the metallic surfaces without interfering in the slightest degree with the process of deposition. But in plating or gilding, the greatest care is required to remove by boiling in caustic alkali and thorough washing every trace of grease, and render the articles perfectly bright.

—The form of the battery usually employed in electrotyping requires two vessels, in one of which the electric current is generated, and in the other, which corresponds to the decomposition cell, the articles to be acted upon are suspended in the metallic solution. A Smee's battery may conveniently be used for generating the current, and a wooden cistern to contain the solution of sulphate of copper. The objects to be coated are suspended from a metallic rod resting upon the two ends of the trough near one edge, and a copper plate is suspended so as to face these objects a little distance off toward the other side of the trough. The rod being connected with the zinc plate, and the copper with the platinum of the battery by brass wires, the circuit is complete, and the deposition immediately goes on. A battery of novel construction is described by Prof. Jacobi of which an account may be found in the article *Galvanoplastie* of the *Dictionnaire des arts et des manufactures*. It is called the pile of Prince Bagration, and surpasses all others in the regularity of its action, its extreme simplicity, and the little care it requires. It will continue in operation more than 6 weeks without attention, demands no skill or experience in chemical manipulations, and costs a mere trifle. Jacobi thinks its discovery must have an important effect upon the art of reducing ores, and throw light upon many obscure subjects connected with industrial operations. A flower pot or any such vessel impervious to water is filled with earth saturated with a solution of sal ammoniac. In this a plate of copper and another of zinc are placed a little distance apart, and wires are attached to them. A voltaic pair of simple form is thus obtained, which may be kept in action for months or even for years, if the earth is occasionally moistened with the solution and the zinc plate is removed when it is at last worn out. It is well to leave the copper plate for a few moments in a solution of sal-ammoniac before putting it into the earth, and let it dry until a decided oxidation appears upon its surface. By uniting several pairs a constant current is obtained, long continuing and perfectly regular in its action, which may be employed for various purposes; as for example, to reduce metals to their most malleable form. Jacobi made use of a battery of 24 pairs. He recommends that the vessels containing the pairs should be carefully isolated. The subject is strongly commended to the attention of those engaged in electrotyping, not merely for its economy, but for its entire freedom from the noxious vapors which are given off from batteries requiring the use of nitric acid.—In the use of the batteries the metallic deposition is obtained in different conditions, which vary with the intensity of the current, the strength of the acid solution, its temperature, &c. To obtain the copper in a clean metallic state, the solution of the sulphate must be acidulated with sulphuric acid, and be kept well saturated by constant supplies of fresh sulphate of copper, or by sufficiently large copper plates. There should also exist a proper relation between the zinc and the acid which acts upon it, and the object to be coated. If the zinc plate be large and the object very small, the copper is likely to be of brittle texture, or it may be deposited in the form of a powder if the difference be considerable. If the sulphate of copper solution becomes nearly exhausted, or the electric current is disproportionately strong, or the positive pole disproportionately large, the copper is likely to be separated in the form of a black

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powder, with the collection of much hydrogen upon the negative plate. This tendency may be corrected by one or another of the following means, as recommended by Smee. The intensity or quantity of the battery may be lessened; the negative pole may be increased or the positive reduced in size; the solution may be saturated, or it may be rendered neutral; or lastly, the temperature may be lowered. The process succeeds best at a temperature not lower than 60°. By properly regulating the operation, copper plates may be obtained suitable for printing engravings from, which will wear quite as well as the original metal; but the method as now practised is not to obtain the whole thickness of the plates by the electrotype operation, for a very thin surface of copper is sufficient to preserve the exact impression, and this is more economically backed with some cheap alloy. An inferior quality of type metal answers this purpose very well; it melts readily, and may be made to cohere to the copper facing by simply pouring a layer of it over the thin sheet, which is laid flat upon its face on a smooth hard surface upon which it is firmly secured by elastic slips of steel extending from its edge to a fixed object a little above. The back of the copper more readily unites with the alloy if it has been previously coated with tin by pouring this metal when melted over its surface, as the sheet is held in an inclined position. It is this process which is employed in electrotyping the pages of this work. Every page of type, after it has been used for furnishing proofs, is impressed upon a surface of wax. This is then covered with plumbago in fine powder, and all the superfluous powder is blown off or brushed away in an apparatus constructed with fine brushes for this purpose. By the application of this conducting medium every portion of the wax face is made capable of receiving the coating of copper, when the cake is encircled by wire and suspended by it to the rod connected with the zinc plate of the battery. The metal as it is deposited enters into the most minute depressions and retains the most delicate markings as distinctly as they appear in the wax. The page of type being thus duplicated, the members that composed it are at liberty to be distributed for the combination of new pages; and thus a single fount may be kept in continual use for the setting up of series of works, of which copies or editions may be struck off as they are wanted. The thin sheets of copper are backed with a kind of type metal, and the plates are then planed upon the edges and back by sharp knives, by which they are brought into proper shape and thickness. Electrotyping is preferred to the ordinary method of stereotyping, or taking a cast in type metal of the impression of a page of type made in plaster of Paris, for the reasons that the stereotype is more subject to defects, does not present so sharp an outline of the letters, and is less durable than the copper-faced electrotype. The battery employed by the printing house engaged upon this work is of unusual dimensions. The decomposition cell is a cistern of wood, 12 feet in length, 2 feet in width, and 3 feet deep. It contains about 538 gallons of an acidulated solution of sulphate of copper, which is kept for years of uniform strength by the sheets of copper suspended in it opposite to each surface exposed for the reception of a metallic coating. The objects to be electrotyped are placed in the solution in the evening and taken out in the morning. They are suspended on brass rods which lie across the top of the cistern; one end of each rod is turned over at right angles to form a short foot, which dips into a channel of mercury that extends along the outer edge of the cistern. This basin is formed by turning over the upper edge of a broad sheet of copper that is attached to the side of the cistern, and extends beyond it to the other cistern forming the battery, where the same sheet of copper is again turned up to make another channel for mercury into which the poles of the zinc plates are introduced on one side. Those of the platinized copper forming the other pole of the battery dip into another corresponding channel of mercury on the other side of the battery cistern, through which connection is made in the same manner on that side with the decomposition cell, other brass rods standing with one foot in this channel supporting the sheets of copper which are suspended in the solution to complete the circuit and furnish the metal for the deposit. The battery is constructed with plates of amalgamated zinc alternating with others of platinized copper, each plate measuring 10×14 inches. They are let down in grooves cut on each side of the cistern, their lower edges not reaching within some inches of the bottom. According to the amount of work to be done, the number of plates is reduced or increased; 18 or 20 of each are ordinarily in use. The acid employed as the exciting liquid is the common sulphuric acid.

—A variety of substances are employed beside wax for obtaining moulds of medals and other small objects for electrotyping. Fusible metal made by melting several times 8 parts of bismuth, 5 of lead, and 3 of tin, is well adapted for this purpose. Another fusible alloy used by the French for their *elichée* moulds consists of 8 parts of bismuth, 4 of tin, 5 of lead, and 1 of antimony. The medal is set in a block of wood, and just as the metal, which is poured in a shallow box lined with smooth cartridge paper, is on the point of setting, the medal is laid upon it, and struck gently so as fairly to impress its surface. If any oxide is formed on the surface of the alloy, it should be skimmed off with the edge of a card. Plaster of Paris is also employed for the same purpose; and gutta percha is found to be well suited for it. The latter is softened at the temperature of boiling water, and pressed upon the medal, which is surrounded with a metallic rim. When cold the gutta percha is found, if the process is well performed, to have received an admirable impression. This is treated like

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the wax to render it susceptible of receiving the metallic coating. Powdered zinc is sometimes mixed with the fine plumbago to increase its conducting power. The zinc is melted in an iron ladle, and when just ready to take fire, a few pieces of iron are dropped into it. When cold, the mixture is easily pulverized.—Electrotyping may be applied to the preservation of various delicate objects by coating them with a metallic deposition. Insects and delicate flowers are made conductors by dipping them in a weak solution of nitrate of silver, and then precipitating the silver upon every portion of them by exposure to the vapor of phosphorus, or sulphurous acid gas, or even to the action of the light. Cloth of different kinds has thus been coated with a metallic covering, and lace has been beautifully gilt and ornamented. A sheet of copper, precipitated upon a surface of morocco of any desired pattern, may be used for embossing the surfaces of other skins. Copies of daguerreotype pictures have been taken by this process. A conducting wire of broad surface being soldered to the back of the picture, and the portions not intended to be coated being covered with wax, the plate is put into the solution of sulphate of copper, precisely as if it were a medal to be electrotyped. The deposit is removed when sufficiently thick, and the copy, which is wonderfully exact, is often found to present a softer and finer expression than the original. The face of the picture may be gilded by subjecting it to the action of a very feeble electric current in a weak solution of cyanide of gold and potassium. In applying the process to the incrusting of fruits, leaves, and similar organic substances, for the purpose of preserving their forms, either in the metallic shell deposited upon them or by making use of this as a mould for restoring the object in solid form, the body is first covered with the plumbago powder, and a pin is inserted at one extremity by which it is supported upon the wire of the battery connected with the zinc plate. The pin, after the operation is completed, is withdrawn, and through the hole it leaves the fluids of the fruit may be expelled by heat. Bronze statues are made from the hollow plaster casts obtained from the original model in clay; these casts, which may be in several sections, being coated with plumbago powder, and exposed to the sulphate of copper or a bronze solution. The sections thus obtained are fitted and soldered together, and electrotyped over the soldered joints.—Electro-plating is the covering of articles by the electric current with a coating of silver. It is very extensively practised for giving to ware made of cheap alloys, as britannia metal, German silver, pewter, or brass, the beauty and excellence of silver ware, at the cost of a very thin coating of the more expensive metal. The solution of silver has formerly been obtained by dissolving the metal in dilute pure nitric acid; distilled water is afterward added, and the silver is precipitated as a cyanide by a solution of cyanide of potassium. The silver precipitate, being collected and well washed, is dissolved in a solution of cyanide of potassium, and this is the fluid used in the place of the sulphate of copper solution employed for the deposition of copper. But a more convenient mode of obtaining the solution is to connect a plate of silver with the positive pole suspended in a solution of cyanide of potassium, and allow the current to pass until the silver begins to deposit rapidly upon the negative pole. To insure the cohesion of the silver upon every portion of the surface exposed, the latter must be thoroughly cleansed, which is best effected by boiling the articles in an alkaline ley, then dipping them into nitric acid, and finally scouring them. The copper wire is then attached to any portion, or wound around the body, and this being again dipped for an instant in nitric acid is then suspended to the metallic rod which connects with the zinc plate of the battery, its surface opposed to a plate of silver connected with the other pole; after being in the solution a few seconds, and receiving the first coating of silver, the article is taken out and rubbed with a hard brush and a little fine sand. It is then replaced and left for several hours in the solution, when it acquires a coating as thick as tissue paper, of a dead white silver. It may be then polished with a hard brush and whiting, or burnished. The hardness of the silver varies with the power of the battery, a weak current depositing silver of very soft quality; but if the battery is too powerful, or the silver plate forming the positive electrode is very large in proportion to the article to be plated, the silver is apt to be precipitated in the form of a black powder; with due proportions between the power of the battery and the work to be accomplished, the silver deposit may be of the hardness of the rolled or hammered metal. Any desired thickness of the deposit may be given according to the time the operation is continued. A plating as thick as ordinary writing paper consumes from 1½ to 1¾ oz. of silver to the square foot of surface. As before mentioned, the silver is more equally deposited by keeping the articles in motion as the process goes on. The silver is rendered harder also by the motion as well as by intensity of battery; and thus, though only the pure metal is deposited, it is rendered as durable as the alloy used for silver coin.—The solution employed for electro-gilding is prepared by digesting the chloride of gold, obtained by dissolving the metal in nitro-muriatic acid, with calcined magnesia. The oxide, which falls as a precipitate, is washed by boiling in nitric acid, and is then dissolved in cyanide of potassium. The solution of the double salt is used, as that of the cyanides of silver and potassium in plating. The temperature is not allowed to fall below 130° F. in gilding copper, and for gilding silver it should be still higher. The battery must be formed with the positive plate of gold, and the negative may be of iron or copper in a porous vessel containing cyanide of potassium. The same attention must be given to having the surfaces to be gilt thoroughly cleaned, except that the use

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of nitric acid is dispensed with. Metallic surfaces that do not readily receive the deposit of gold, as those of iron, steel, lead, &c., may first be coated with a thin layer of copper, upon which the gold is then deposited. The solution should contain sufficient gold to deposit all that is required at once. The value of the material employed is very trifling in comparison with the effect produced. A silver thimble receives only 5 or 6 cents' worth of gold; a common sized watch case, thinly coated within and heavily without, requires only from 20 grains to a pennyweight, or about the value of a dollar; and a pencil case from 3 to 5 grains, or less than 20 cents' worth.—The applications of this new and interesting art are already wonderfully developed, and its practice gives employment to many thousands of workmen in the large plating and other electro-metallurgic establishments of our cities and manufacturing towns. The facing of printers' types with copper, now largely practised, trebles or quadruples their durability. But it is by no means probable that its most valuable uses are yet discovered. In France the possibility of applying its principle to the separation of metals from their ores, has been seriously considered by scientific and practical men; and when more economical modes of exciting the electric current are developed, it is probable that this mode of reducing some of the ores may be successfully practised. It has even been thought possible to apply a coating of copper in one sheet upon the bottom of a ship by this method, or to restore old sheathing by adding to its thickness without removing it from the vessel; and it has been proposed, as a more economical method of obtaining the electric current, to employ the magneto-electric machine, in which this power is generated by the consumption of cheap fuel in running a steam engine, instead of the more expensive zinc in the voltaic battery. But in the experiments of Messrs. Elkington and Mason, of Birmingham, England, with the command of a magnificent machine, and of steam power, the current was found to be too unsteady to admit of good work. Machines of the same construction have been introduced into New York and applied to practical operations in electro-plating.

ELECTRODE (Gr. ηλεκτρον, and οδος, a way), a term applied by Prof. Faraday to the surface, whether of air, water, metal, or other substance, by which electricity passes into or out of other media. It corresponds with the pole of the galvanic battery.—Under another derivation from ηλεκτρον, and ειδος, like, the term has also been employed to designate bodies which become electric like amber.

ELECTROLYSIS, ELECTROLYTE (Gr. ηλεκτρον, and λυω, to set free), terms which were introduced by Prof. Faraday, and applied, the one to decomposition produced by the electric current, and the other to a body susceptible of direct decomposition in this manner.

ELECTROMETER (Gr. ηλεκτρον, and μετρον, measure), ELECTROSCOPE (Gr. ηλεκτρον, and σκοπεω, to see). These terms are often used as synonymous, though the former is properly the name of an instrument for measuring the intensity of the electrical excitement, and the latter of one for rendering it apparent by its effects. The torsion balance of Coulomb admirably combines the requirements of both instruments, but a great number have been contrived of both, and of greater pretensions and complicity, which it will not be necessary to describe. A very fine brass wire is suspended from a fixed point, and kept stretched by a small weight attached to its lower extremity. Near the weight a fine needle is attached to the wire in a horizontal position, one of the ends of which is a conductor, and the other a non-conductor of electricity. A graduated arc is arranged around the circumference of the glass vessel in which the needle is suspended. The small body, the electricity of which is to be determined, being let down the side of the vessel, causes the swinging index to diverge or be attracted, and the amount of the movement is measured by the number of degrees upon the arc passed by the index on the opposite end of the needle. An instrument has been constructed in which a force equal to $\frac{1}{76800}$ of a grain caused the needle to traverse the whole circumference, so that a movement of one degree indicated a force not greater than $\frac{1}{213333}$ of a grain. For an instrument so delicate, the suspending wire is of extreme fineness and considerable length. The principle adopted for determining the relation between the electric force and the quantities of electricity in bodies was to take two perfectly similar conducting balls, and after charging one and determining its effect upon the balance, bring it in contact with the uncharged ball. The amount of electricity is then equally divided between the two, which may be proved by testing their equal effects upon the balance. One of these may then be made to give up half its electricity to another perfectly similar uncharged ball, and so the quantity may be continually reduced in known proportions to any desired extent. An electric needle used as an electroscope, is a light bar of some non-conducting substance, supported upon a point like a magnetic needle, and bearing upon one extremity a small body charged with a known electricity. Bennett's gold leaf electroscope, which is much used, consists of two thin strips of gold leaf, fastened in the end of a metallic rod, which passes through the neck of a bell glass, and terminates above in a brass knob. These strips of gold leaf hanging in the centre of the bell glass will diverge when any body electrically excited is brought near or in contact with the brass knob. It is well to place two conducting bodies in such a position in the bell glass that each strip of gold leaf may hit against one of them, and thus discharge its electricity; for otherwise, if they come in contact with the non-conducting glass as they diverge, their tendency is to remain attached to it. The subject is particularly noticed in the preceding articles treating on electrical subjects.

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ELECTROPHORUS (Gr. ηλεκτρον, and φερω, to bear), a convenient form of an instrument for obtaining and holding small quantities of electricity for a considerable time. It consists of a flat, smooth cake of resin, made by pouring the substance when melted into a wooden mould in which it may be allowed to remain; and also of a disk, either of brass or of wood covered with tin foil, its diameter less than that of the cake; its edges should be rounded. A glass handle is inserted into the middle of the disk at right angles with its surface. The surface of the cake, as it lies upon the table, being rubbed or beaten with the skin of a cat, is soon charged with negative electricity. If the disk is then laid flat upon the cake, touched with the finger, and then taken off by the handle, it is found to be charged with positive electricity, so as to give a spark like the prime conductor of the electrical machine. By renewing the contact it is charged again, and the process may be repeated hundreds of times, the resin often retaining its electricity for many days. The positive electricity in the disk is developed by induction. If the disk is left insulated without touching the finger or other conductor to it, no electricity is developed in it, except a slight negative charge received directly from the resin.

ELECTROTYPE. See ELECTRO-METALLURGY.

ELECTUARIES, a name retained in the Edinburgh pharmacopœias for mixtures of medicinal substances, generally dry powders, with sugar or any sweet sirup, to render them more convenient to take. Conserves are similar preparations, the saccharine portion being intended to preserve the other ingredients mixed with them. The word confection is now in use in the pharmacopœias of the United States, London, and Dublin, to include both.

ELEMENT, CHEMICAL. In the present state of science this term admits of no very precise definition. In general, the word element is applied to any substance which has as yet never been decomposed into constituents or transmuted into any other substance, and which differs in some essential property from every other known body. Several elements indeed occur under two or more allotropic conditions, in which states they exhibit different properties. These modifications are however mutually convertible into each other, and are regarded as mere varieties of one and the same substance. As now used, the term element does not possess in any degree the absolute signification at one time attached to it by the ancients, none of the elements now admitted being regarded as true primary principles of matter. It is indeed not impossible that some of them may belong to this class; but of this nothing is known. Provisionally, all substances which have hitherto resisted every method of analysis that has been applied to them—all, in short, which cannot be proved to be compound—are called elements. As may readily be conceived, the number of these bodies is constantly changing with the advance of science. At present 61 such are admitted. Although this number is very small in comparison with the almost infinite variety of material substances which occur in nature, or are produced artificially by man, it will doubtless eventually be greatly lessened; all analogy teaching that the really essential elements of matter must be very few. Thus far, however, the number of elements has been continually, though slowly, increasing through the discovery of new substances. The latter have occurred in most cases only in extremely minute quantities, and in but few localities; some of them have hardly been seen by any one except their discoverer. The properties of many have not as yet been thoroughly studied. Such are viewed with suspicion and distrust by chemists, and, until authenticated, merely tolerated on the list of elements. The great mass of the matter of which the world is composed consists of about 30 elements, the remaining 31 being of comparatively slight importance. The term simple or undecomposable (better undecomposed) substance is often used synonymously with element. In popular language, fire, air, earth, and water are sometimes called elements. The last 3 are, however, compounds, while the former is an appearance, occasioned by the development of light and heat which attends chemical combination, &c.—For a complete catalogue of the elements, see EQUIVALENT.

ELEMI, a resinous exudation from a number of trees in different parts of the world. Coming from so many sources, the substance known in common is by no means of uniform character, and the trees which afford the gum are very little understood. That from Holland is supposed to be from the Dutch East India possessions, and the product of the *canarium balsamiferum* of Ceylon. The Manila article is believed to be the product of the *canarium commune;* that of *C. album* or *arbolabrea* is used in the Philippine islands for pitching boats and vessels. The Brazilian elemi is from the *icica icicariba;* the *icica* is a genus separated from *amyris*, to which the elemi is commonly referred. The Mexican is said by Dr. Royle to be from a species of the *elaphrium*, which he names *elemiferum*. The resin is imported in various shapes, and in different colors and degrees of consistency. It was formerly much employed in plasters and ointments, but is more used in Europe than in this country. Hatters make use of it, and it is in some demand for varnishes by coach painters. It is one of the ingredients of pastilles burned as incense. It has been resolved into two resins, one amorphous and one crystallizable, for the latter of which the name elemine has been proposed by its discoverer, M. Baup.

ELEONORA OF ESTE, an Italian princess, whose name is associated with the love and madness of Torquato Tasso, born June 19, 1537, died Feb. 10, 1581. She resided in Ferrara at the brilliant court of her brother, Alfonso II., of which she and her sister Lucrezia were the most accomplished ornaments. Tasso seems to

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have conceived an ardent passion for Eleonora, and to have addressed to her some of his most fervent effusions, to the discovery of which the persecutions to which he was subjected by Alfonso were in part ascribed. But the evidence on the subject is conflicting. There were several other ladies of the name of Eleonora whom Tasso celebrated; as, for instance, Eleonora San Vitale, the beautiful countess of Scandia, in whose praise he wrote charming verses. However, most biographers agree in pointing to the princess Eleonora as the lady of his special adoration. How far the princess reciprocated his affection is not clearly established, and the presumption is that she gave him only friendship and poetical sympathy in return for his love. She was never married.

ELEONORA OF TOLEDO, daughter of Peter of Toledo, viceroy of Naples, born in 1526, was married in 1543 to Cosmo de' Medici, afterward grand duke of Tuscany, fought with great bravery against her husband's enemies, captured the chief of them (Filippo Strozzi), afterward accompanied Cosmo in the war between the emperor Charles V. and Francis I. of France, and was actively engaged in the taking of Sienna. In the latter part of her life she was distinguished for her judicious patronage of letters, the fine arts, and works of charity.

ELEONORA TELLEZ, a beautiful Portuguese woman, born in 1330, died in 1405, the daughter of a poor nobleman, was married in 1346 to a gentleman of fortune, but of less ancient descent, and much her superior in years. He brought her to the court of Lisbon, where Ferdinand I. fell in love with her. She declined becoming his mistress, but became his wife, after having been legally divorced from her husband. But her heart was as little interested in her second as it had been in her first marriage. She fell in love with a young Castilian nobleman, Don Juan d'Andeiro. Her preference for him and her tyrannical disposition produced great discontent and led to her overthrow. After the death of the king, her favorite was assassinated by the king's brother, the infante Don John (Dec. 6, 1383), who usurped the government. Eleonora besought the assistance of John of Castile, who had married Beatrix, the only child she had borne to Ferdinand. John caused her to be placed in a convent in Spain, where she died.

ELEPHANT (*elephas*, Linn.), the only existing representative of the proboscidian pachyderms; the mammoth or fossil elephant, and its congener, the mastodon, having lived in the preceding geological epoch. The elephant, the largest and heaviest of terrestrial animals, has from time immemorial been celebrated for his intelligence and sagacity, for the services he has rendered to man in eastern lands, for his imposing appearance, for his immense strength guided by gentleness and docility, and for the astonishing feats he is able to perform by means of his trunk. Since the time of Cuvier the anatomy of the elephant has been thoroughly studied. The skull is remarkable for its vertical elevation, giving to the head the well-known aspect of sagacity; this, though far superior to that of the other pachyderms, has doubtless been overrated from the peculiar cranial formation in this animal. The great elevation of the frontal region does not arise from any increase of the cranial cavity or corresponding development of brain, but depends on the great separation of the tables of the skull, and the excessive enlargement of the frontal sinuses, affording ample space for the origin of the muscles of the trunk; the upper jaw has a similar structure for the accommodation of the enormous tusks; in both cases strength and solidity are obtained without too much weight. The nearly perpendicular facial line of the elephant, then, depends on the size of the frontal sinuses, the shortness of the bones of the nose, and the vertical position of the maxillary and intermaxillary bones; and the cranial cavity occupies but a small part of the head at its posterior central portion. The occipital bone forms the posterior wall of the skull, and advances also on to its upper surface; the parietals are early consolidated to it, to each other, and to the temporals, forming a solid box; the ethmoid is large, and the extent and surface of the cribriform plate indicate a delicate organ of smell; the sphenoid is very flat internally, but its cells are enormously developed, encroaching largely upon the base of the skull. The teeth consist of 2 long curved tusks, one in each intermaxillary bone, and of large and compound molars in each jaw. The permanent tusks, which are monstrous incisor teeth, are preceded by 2 small deciduous ones, which make their appearance between the 5th and 7th months, rarely exceed 2 inches in length and ¼ of an inch in diameter, and are shed before the 2d year, their roots being considerably absorbed; about 2 months after the milk teeth are shed, the permanent tusks, which are situated to the inner side of and behind the former, pierce the gum when about an inch long, and grow from the base during the whole life of the animal. The molar teeth are remarkable for their size and the complexity of their structure; there is not more than one wholly, or two partially, in use on each side in each jaw at one time; they are constantly in progress of destruction and formation, succeeding each other horizontally, instead of vertically as in other mammals; according to Owen, the molars are successively brought forward until each jaw has had on each side 6, or 24 in all. For the minute details of the structure and development of the molars, the reader is referred to the *Ossemens fossiles* of Cuvier, and to the "Odontography" of Owen. It will be enough to say here that each tooth is composed of a number of transverse vertical plates of dentine or ivory, enveloped in enamel, and united together by the cement of crusta petrosa; only a small portion of the crown appears above the gum. This gradual progress of the teeth from behind forward explains how the elephant has always a grinding surface ready to bear the great pressure to which his teeth

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are always subjected; the constant wear of the grinding surface keeps it in order for mastication; the manner in which the enamel is arranged on this surface, after the ivory is worn down, enables the anatomist to refer a tooth either to the Asiatic or African elephant. From the oblique position of the molars in the jaws, the anterior portion pierces the gum first, and may be quite worn while the middle and posterior portions are slightly or not at all used, so that these teeth diminish in length at the same time that their depth is worn away; as the anterior grinding surface becomes useless, the root is removed by absorption, enabling the tooth to be pushed forward by that behind. The tusks are formed of ivory and enamel, the former making the central and by far the largest portion; the tusks exist in both sexes, but are smaller in the females than in the males; they sometimes measure 9 feet in length, and weigh over 200 lbs. the pair; this great weight is kept in place only by the tight embrace of the socket and surrounding parts, explaining the abnormal direction of the tusks produced either by sudden and violent or by gentle and long continued pressure. The lower jaw is massive, and prolonged in front, where the extensible lower lip is elongated into a triangular deeply concave organ for receiving the extremity of the trunk. The spine consists of 7 cervical vertebræ, 20 dorsal, 3 lumbar, 5 sacral, and from 24 to 26 caudals; the number of ribs is 19, and in some specimens 20, of which 5 or 6 are true. The thoracic cavity is very large, the ribs being continued back nearly to the pelvis, of great size and width; the sternum is long, compressed laterally, and somewhat prolonged in front. The limbs being designed more for strength and solidity than speed, their bones are thick and large; the shoulder blade is wide, its posterior margin much the shortest; and the spine, beside the acromial process, has a broad, sickle-shaped prominence extending downward and backward; there is no clavicle, as the approximation of the limbs toward the centre of gravity is necessary to support the weight of the body. The humerus is short and massive, the upper extremity having a flat articular surface with large protuberances for the insertion of the muscles of the shoulders, a strongly ridged shaft, and a pulley-like lower surface for the forearm, admitting only of flexion and extension; the external condyle is very extensive upward. The radius and ulna are permanently pronated, and both enter into the formation of the elbow and wrist joints; the 8 bones of the wrist are arranged in 2 rows, and the 5 metacarpals are short and robust, 5 fingers being attached to them; the fingers, however, are concealed by the thick and overhanging skin, with the exception of the ends. The pelvic bones are large, to accommodate the powerful muscles to which they give origins; the ilia are broad, rounded anteriorly and concave toward the abdomen; the femur is simple in shape, comparatively smooth, resembling considerably that of man; this resemblance is continued in the leg and tarsus; the os calcis is very large and prominent; the metatarsus consists of 5 bones, the external one being imperfectly developed; the toes are also 5, each consisting of 3 bones, except the outer, which has one, all encased in the thick skin, the division being indicated only by the projecting extremities. The bones of the elephant may be easily distinguished from those of other quadrupeds; they resemble, except in size, the bones of man, particularly the cervical and dorsal vertebræ, the shoulder blade and pelvis, the femur, tarsus, and the bones of the metacarpus and metatarsus; so that it is not surprising that even anatomists, ignorant of the elephant's skeleton, should have mistaken their recent and fossil bones for the remains of gigantic human beings. The food of the elephant is entirely vegetable, and must be immense in quantity, and the digestive apparatus is accordingly largely developed; the stomach is simple, of a lengthened and narrow form, its cardiac extremity being prolonged into a pouch of considerable size, its internal membrane divided into thick folds and transverse wrinkles, and its muscular coat very thick; the small intestines are voluminous, and the large of enormous size; in a moderate-sized animal the intestinal canal was 60 feet long, the small intestines being 38 feet, the cæcum 1½, and the large 20½ feet; the circumference of the 1st being 2 feet, of the 2d 5 feet, and of the last (colon) 6 feet. The gall bladder is situated between the coats of the duodenum, and is divided by transverse partitions into 4 compartments; the spleen is 4 feet long. The heart resembles that of the rodents in having 3 venæ cavæ opening into the right auricle, 2 above and one below, and the Eustachian valve is furnished with a rudimentary superior division. The brain is small in proportion to the size of the animal; in one 7½ feet high the whole organ weighed but 9 lbs., and in another 9 feet high the internal capacity of the cranium was only 354 inches, being less than 3 times the weight of the human brain, and less than 4 times the capacity of the Caucasian skull; the convolutions are well marked, and the cerebellum is proportionately very large; the 5th pair of nerves, which supply the trunk, are enormously developed. The trunk of the elephant is an elongated nose, but is chiefly an organ of touch, though capable of being used for smelling; it forms a conical mass, 4 or 5 feet long, gradually tapering to the end, which is provided with a thumb-like appendage, endowed with a most delicate sense of touch, and capable of picking up a needle; it contains a double tube, strengthened by membranes, extending up as far as the bony nostrils, just before which they form a sudden curve; the true nasal passages are provided with a valve by which the cavity of the trunk may be cut off from the nose, a provision rendered necessary when the animal takes fluid into the former. The great bulk of this organ is made up of transverse and longitudinal muscles so arranged that the trunk may

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be elongated, shortened, raised, and bent in any desired direction, with all the precision of the human hand. Though the trunk is capable of performing the most delicate operations, it is also an organ of great strength and a weapon of the most formidable character; with it the animal tears the branches from trees in its search for food, performs the heaviest tasks for his human owner and defends himself from his smaller enemies; with it he introduces food and drink into his mouth, which, from the shortness of his neck, he cannot bring to the ground; by inspiring through the trunk he fills it with water, which he discharges into his mouth or in refreshing showers over his back. So important is this organ that the animal's first act when in danger is to raise it above his head; when hunting the tiger or other wild animal, he carries it high in the air; any wound of it seems to render him helpless; in ordinary cases he rarely uses it to strike an object. When crossing deep rivers the body is deeply immersed, and respiration can be carried on with only the tip of the trunk above water. The sense of smell is acute, though not resident in the trunk proper, as is indicated by the extent of the frontal and maxillary sinuses communicating with the nose; the sphenoidal sinuses are also of unusual dimensions. The sense of hearing is also acute, as it should be for an animal living in thick woods and jungles, in which vision can hardly detect the approach of an enemy; the ear communicates with extensive bony cells, and the external auricle is large to collect the sounds and convey them to the tympanum. The eye is small, but is well protected by thick lids and a nictitating membrane. The muscular system is of immense strength; and the ligamentum nuchæ, which supports the heavy head, is of uncommon size and firmness.—Elephants inhabit the tropical forests of Asia and Africa, living in troops; though often destructive to trees, and especially to saccharine plants, they are quiet and inoffensive unless attacked by man or other animals; they prefer well-watered regions, where a large herd may frequently be seen guided by some old male, keeping in the shade during midday and feeding at morning and evening; easily alarmed, they retire to the woods at the approach of man, but if pursued will turn and attack him with the greatest fury. Only 2 species are described, the Asiatic and the African elephant. The Asiatic elephant (*elephas Indicus*, Cuv.), extensively distributed over S. India and the E. Asiatic islands, has an oblong head, concave forehead, and the crowns of the molars presenting transverse undulating ridges; the ears are small compared with those of the African species. The skin is hard and thick, wrinkled about the legs, neck, and breast; the general color is a brownish gray, mottled sometimes with lighter spots; pure white albinos are very rarely seen; the hairs are few and rigid, most abundant on the head; the feet have 5 toes, the nails of which are seen beyond the cutaneous envelope. The usual height is from 7 to 10 feet, that of the females a foot or two less; specimens are on record considerably larger than this, some having a length of 15 feet and a height of over 12. The period of gestation is about 20½ months; the new-born animal is 3 feet high, with all its senses perfect; sucking is performed by the mouth, the trunk being turned back, and is continued for a period of nearly 2 years. The young grow rapidly, being 4 feet high in the 2d year, and are said to be suckled indiscriminately by any female in the herd; they attain maturity at about the age of 30 years, and live certainly for 150 years, and probably for 200. The weight of a full-grown elephant is from 3 to 5 tons; one kept in London for many years, between 10 and 11 feet high, consumed daily 3 trusses of hay and about 200 lbs. of carrots and fresh vegetables, drinking from 60 to 80 gallons of water; this fine specimen cost, on his arrival in England in 1810, 900 guineas; he performed in pantomimes at the theatres for several years; he was subject to periodical fits of rage, during one of which it was deemed necessary to kill him, which was done by the discharge into his body of about 150 rifle balls, and by several severe sword and lance thrusts. Though the elephant will breed in captivity, the supply for domestic and warlike purposes must be kept up by hunting the wild animals and reducing them to servitude; the favorite way in India is to capture the wild by the aid of tame animals, especially females; these display as much treachery, ingenuity, perseverance, and courage, as did ever human seducer to compass the destruction of a victim. Following in the track of the male wild animals, the wily females move gradually toward them, grazing with the same complacency and indifference as if they were inhabitants of the forest; while the females are cajoling a male, the hunters cautiously approach and fasten his legs by ropes to trees, the former distracting the attention of the intended captive, and even assisting in binding the cords; the females then leave him, when he has discovered his condition, to vent his useless rage to his own exhaustion; further reduced by hunger and thirst, he will soon allow himself to be led by his treacherous companions to stations appointed for the training of elephants, where, after a few months' discipline, he becomes quite docile and contented. There are various other modes of taking elephants by female decoys, by stratagem, and by driving. Elephants, both Asiatic and African, frequently figure in the history of the wars of the Greeks and Romans. Darius III. had a small number of them in his war against Alexander; Porus of India brought a large number into the field against the same conqueror. Seleucus had hundreds of them in his army at the great battle of Ipsus. Pyrrhus of Epirus, Hannibal, and Antiochus the Great fought with elephants against the Romans, who themselves soon made use of them in their campaigns, and also exhibited them at their public shows, triumphs, and combats of

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wild animals in the theatres. In the ancient Indian empires, elephants formed a necessary appendage to the royal retinue; they were used for show, for warlike purposes, and for carrying burdens. In the East at the present time elephants are employed for transporting baggage, dragging artillery over difficult places, and otherwise in connection with army movements, but without entering into the actual manœuvres of battle; they exercise their strength and sagacity in lifting, dragging, and pushing with their leather-protected foreheads. When the elephant gets under full headway, his speed is considerable, and his momentum overcomes all ordinary obstacles; though able to carry an immense weight on a level surface, he is liable to totter and fall backward when forced up considerable elevations; a strong animal can travel 50 miles a day, with a burden weighing a ton. The anecdotes illustrating the docility, affection, sagacity, irritability, capriciousness, and revengeful spirit of the elephant, are innumerable, and may be found in various well-known books on natural history. The natural enemies of the elephant, beside man, are the tiger and the rhinoceros, and the nasal horn of the latter often proves a more formidable weapon than the trunk and tusks of the elephant; the sight of even a dead tiger is enough to excite most elephants into a transport of fury.—The African elephant (*E. Africanus*, Cuv.), genus *loxodonta* (F. Cuv.), has a more rounded head, a rather convex forehead, enormously long ears, and cheek teeth with lozenge-shaped divisions of the crown; the generic name of F. Cuvier was founded on the last characteristic. It inhabits Africa from Caffraria to the Niger, living in similar localities and with the same manners as the other species. The males attain a height of over 12 feet, but decrease in size north of 20° S. latitude; the tusks, however, are larger, according to Livingstone, as you approach the equator; the females are smaller than the males. Under the tropics, animals as well as men decrease in size, though food there is most abundant; such climates seem unfavorable to full animal development. The natives estimate the height of this species by doubling the circumference of the impression made by the fore foot; this is tolerably accurate for adult animals. In the most favorable localities the African elephant is considerably larger than the Asiatic; but toward the equator the female African is about as large as the Asiatic male. The ear of the African species is sufficient to distinguish it, being often more than 5 feet long and 4 feet wide, 3 times as large as that of the other species; it descends upon the legs, and is frequently used as a sledge at the cape of Good Hope. From the ancient coins it is evident that this species was known by the old naturalists, and it has been justly said that Aristotle knew it better than did Buffon. It seems to be a dainty feeder, selecting the sweetest fruits and vegetable matters containing sugar, mucilage, and gum; there is a dwarfish evergreen, the "speck boom," which forms very dense jungles in Caffraria, utterly useless on account of its pithy branches even for fuel; this is a favorite food of elephants, which 25 years ago frequented this region in large herds, whose paths are still discernible on the hillsides, and whose bones are seen bleaching in all directions. From this selection of food they are not so injurious to the vegetation of a district as would be supposed, quality being more requisite than quantity. Most of the native tribes hunt them more for their flesh than their ivory, the latter, until the advent of Europeans, being of little value to them except for rings and ornaments; the flesh is much relished as food, and the internal fat is highly prized for domestic and medicinal purposes. They hunted them with light javelins of their own making, overpowering them by numbers. A few white hunters like Gordon Cumming would soon exterminate this noble animal. This species is wilder and fiercer than the Asiatic elephant, defending its young with great courage, and furiously attacking the hunter; though not domesticated in modern times, it probably might be as easily as the other species, were the same pains taken to tame and train it; it can hardly be doubted that the elephants used by the Carthaginians in their wars with the Romans were of African origin. The length of the male tusks is from 6 to 8 feet, and their weight from 60 to 100 lbs. each; Cumming mentions a single one in his possession 10½ feet long, and weighing 173 lbs.; the price which they bring in the English market is from $120 to $160 per 112 lbs. according to quality. Such is the terror which these animals have acquired from the persecutions of man, that a child will put a herd to flight; they are very difficult to hunt, from their hiding themselves in the most remote and inaccessible forests, going often 20 miles by night to water. When at ease they sleep on their sides, but when liable to be disturbed they sleep standing; their gait, when natural, is bold, free, light, and graceful. Cumming gives an interesting description ("Hunter's Life in South Africa," vol. i., p. 304) of the manner in which the Bechuanas cook the feet and trunk of the elephant in hot earth and sand. In his experience from 5 to 30 rifle shots were necessary to kill an elephant, and the best place to direct them is just behind the shoulder; it is useless to aim at the front of the head, as the chances of a ball penetrating the brain from this direction are very small. The destruction of these noble animals for the purpose of supplying the world with ivory must be immense; whenever the regions inhabited by them shall be occupied by agricultural tribes, the animals must retire and finally be exterminated by the inability to obtain sufficient food; when it is remembered what a quantity of vegetable food herds of elephants require, it must be evident that man and such large herbivora cannot coexist in the same districts.—Many species of fossil elephants are described from the drift of Europe and Asia; the best known of these, the *E. pri-*

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migenius (Cuv.), will be treated in the article Mammoth, which is the common name; their remains have been abundantly found in Siberia, and fossil ivory from this source has been an important object of trade. The fossil elephants of Europe resemble most the Asiatic species, but they were more bulky, with larger tusks, narrower teeth, and with the skin covered with hair and wool to enable them to dwell in climates colder than any in which these animals are now found, though not in a climate so rigorous as that of Siberia at the present time, which would be unable to furnish the necessary vegetable food. Fossil species resembling the African, and others with mastodon-like teeth, have been found in the Himalaya mountains by Cautley and Falconer. The fossil elephant of North America is said by Prof. H. D. Rogers ("Proceedings of the Boston Society of Natural History," vol. v., p. 22) to occur above the drift, in the superficial deposits of a distinctly later age; it must, therefore, have been contemporary with the *mastodon giganteus;* indeed their bones and teeth have been found side by side in the marshy alluvium of Big Bone Lick, and the two animals must have been exterminated together; from this one of two conclusions must be derived: either the drifts are not of the same epochs, or else the fossil elephants of the two regions must be different species.

ELEPHANTA, or Garapori, a small island of British India, on the E. side of Bombay harbor, about 5 m. from the mainland; lat. 18° 57′ N., long. 73° E.; circumference about 5 m. It consists of 2 hills with a valley between them, much overgrown with wood, but diversified with some rice fields and pastures. The inhabitants, about 100 in number, are engaged in rearing sheep and poultry for the Bombay market. The usual landing place is on the S. coast, about 250 yards from which, rudely cut from an isolated black rock, was the figure of an elephant, 13 feet long, now fallen to decay, from which the European name for the island is derived. Further inland, about half way up the N. side of a hill, is a remarkable cave temple of unknown antiquity, which has long been deserted by its priests, and is now frequented only by married women praying for fecundity. The spacious entrance, 60 feet wide and 18 feet high, is supported by 2 massive pillars and 2 pilasters, being thus divided into 3 passage ways. The interior breadth of the cavern is 123 feet, and its length, presenting a seemingly endless vista of huge columns cut from the living rock, some of them broken by the Portuguese, who formerly possessed the island, is about 130 feet. The roof is generally flat, though not a perfect plane. The sides are excavated into compartments, all filled with mythological sculptures. Opposite to the main entrance there is a bust supposed to represent the Hindoo trinity, viz.: Brahmā, Vishnu, and Siva. The heads are 6 feet long and well cut. The head dresses are curiously ornamented, and among other symbols a human skull and a young infant are represented on that of Siva, who also holds in his hand a cobra de capello. Several other figures of Siva, one of the 4-faced Brahma, and one of the double deity, half male, half female, called Viraj, formed by the union of Siva with Parvati, are also to be seen. There are 2 smaller excavations on the E. and W. slopes of the hill, similar to the great temple, and filled with representations of Hindoo deities. But what is most remarkable is, that although most of the subjects of these sculptures are evidently Brahminical, and the temples were probably dedicated to Siva, there is at least one figure which appears to be that of Buddha. No record of the origin of the shrines can be found. The general opinion of Europeans who have examined them is that they date from a period subsequent to the birth of Christ, perhaps as late as the 9th or 10th century.

ELEPHANTIASIS. Under this common name two entirely different diseases are comprehended: *E. Arabum*, elephant leg, or Barbados leg; and *E. Græcorum*, elephant skin, or tubercular elephantiasis. I. *Elephantiasis Arabum* was described by Rhazes in the 9th century; it prevails extensively in Barbados, whence the name Barbados leg; it is common in Demerara, Cayenne, and Brazil, in the S. W. part of the island of Ceylon, and on the Malabar coast in India; it is sometimes found in Castile and the Asturias in Spain, and occasional sporadic cases are met with throughout Europe and America. Notwithstanding its name, the disease is not confined to the leg, but may attack almost any part of the body. The attack is ushered in by marked rigor, headache, pain in the back and limbs, followed by heat of the skin, alternating with profuse perspiration, and attended with burning thirst; at the same time some part of the body becomes red and swollen, hot and painful, particularly along the tract of the lymphatic vessels. In a few days the symptoms, both general and local, subside, with the exception that the affected part remains more or less swollen. At irregular intervals similar paroxysms recur, the affected part being each time left more swollen and indurated; as the enlargement increases, the skin often becomes rough, covered with scales, and fissured. The disease is usually confined to one part of the body, though occasionally both legs are affected. The affected parts often attain an enormous size. The causes of Barbados leg are not understood; its occurrence in particular districts shows that local causes have something to do with its production. In the West Indies the negroes, and in Ceylon the native race, are affected much more frequently than the whites; and of the whites, the creoles, those born in the country, are more liable than recent immigrants. In the treatment of the disease in the earlier stages, emollient applications, the warm bath, and bloodletting have been advised. Some physicians think benefit has been derived from the exhibition of mercury. When the disease has already made considerable progress, rest in a

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position which favors the return of the blood from the limb, and compression by means of proper bandaging, are the means most to be relied upon. II. *Elephantiasis Græcorum*, tubercular elephantiasis, appears to have been the disease which during the middle ages was known as leprosy; it is most frequently met with in the West India islands, and in other tropical regions, while it also prevails extensively in certain parts of Norway, where it is known as *spedalsked*. The disease ordinarily commences by the appearance of dusky shining spots upon the skin, slightly swollen, and more or less insensible. After a variable period, which may extend to months, and even years, these spots are succeeded by tubercles or small tumors, soft, reddish, or livid in color, and varying in size from a pea to an English walnut. These tubercles developed upon the face deform it excessively, giving it often a fancied resemblance to the head of the lion, whence one of the names by which the disease is known (*leontiasis*) is derived. As the disease advances, the tubercles become inflamed and ulcerated; the ulcers exude a sanious fluid, and this concretes into thick crusts; the bones become softened and altered in form. In the progress of the disease the gastro-intestinal mucous membrane becomes involved, and tubercles make their appearance in the pharynx; the sense of smell is lost, sight is weakened, and the touch blunted. In this wretched condition the patient may continue to exist a long time, unless cut off, as is commonly the case, by some intercurrent disease. In a second form of the disease, *E. anæsthetica*, patches of an irregular shape, sometimes slightly elevated above the surface, appear upon the extremities, of a tawny color; in whites they are lighter than the rest of the surface; in the negro they are dry, shining, rough, denuded of hair, and insensible. The hands and feet, and then the extremities, generally become swollen, stiff, and numb; ulcers form on the metacarpal and metatarsal articulations; these enlarge, penetrate the joint, and finally amputate the toes and fingers. As the disease advances, the pulse becomes slow and the bowels constipated; sometimes it is complicated with the tubercles of the other variety; in other cases the lobes of the ears, the wings of the nose, and the lips, become thick, hard, swollen, and ulcerated. The patient is listless, and his intellect enfeebled, and in this condition he may live many years. The causes of tubercular elephantiasis are unknown; it appears to be hereditary; but the once prevalent opinion of its contagiousness is not found to agree with recent observations. Of its proper treatment little is known, and when once fully developed it has hitherto seemed incurable.

ELEPHANTINÉ, or ELEPHANTINA (Arab. *Jezeeret-el-Sag*, "islet of flowers," or *Jezireteel-Asswan*), an island of the upper Nile, about 1 mile long and ¼ m. broad, at the foot of the little cataracts, opposite Asswan, the ancient Syene. It is formed of granite covered with a fertile soil. It contains several ancient ruins; among others, the Nilometer mentioned by Strabo, whose upper part was destroyed in 1822, several dilapidated temples, and a gateway, as well as numerous fragments of pottery with Greek inscriptions. In antiquity Elephantiné or Elephantis was renowned for its fertility. Herodotus regards it as forming the boundary between Egypt and Ethiopia; but afterward Phyle was regarded as the southern landmark of Egypt. Elephantiné was strongly garrisoned by the Persians as well as Romans for the defence of this province.

ELEUSIS, in modern times Lessina or Lepsina, a fortified town in Attica, on the bay of Salamis. According to ancient mythology, it was founded by Eleusis, a son of Hermes. At an early period it was conquered by the Athenians and became one of the most populous cities of Attica. Its principal importance was derived from its being the seat of the celebrated Eleusinian mysteries. These mysteries formed a peculiar religious festival celebrated in honor of the goddess Demeter or Ceres, the patroness of agriculture, and the representative of the procreative power of nature. Originally these celebrations appear to have been something like modern thanksgiving festivals, but afterward a symbolic meaning was attached to them, and they became the vehicle of a secret science, conducive, as was believed, to eternal bliss. They consisted in dramatic representations of the myth of Ceres and the rape of Proserpine, her daughter, by Pluto, and would seem to have been intended to propagate the belief in the immortality of the soul, and to give an ideal meaning to the coarse fancies of the popular religion. The great Eleusinian mysteries were celebrated at Athens and Eleusis in the latter half of September and the 1st of October; they lasted 9 days; the lesser took place at Agræ on the Ilissus during the spring. Except to murderers, barbarians, slaves, and afterward Epicureans and Christians, the admission to the public performances and religious exercises was free for all; but in the secret allegorical representations none but the initiated were permitted to participate, and they were bound by solemn oaths never to reveal what they had seen or heard. The unity of God and the immortality of the soul are supposed to have been the secret doctrine of the mysteries. In 1858 a Greek schoolmaster, named Vlastos, discovered at the village of Hagi-Constantios an inscription upon an old marble slab, containing rules and regulations for the celebration of the Eleusinian mysteries, but nothing was learned from them about their allegorical meaning.—See Uwaroff, *Essai sur les mystères d'Eleusis* (3d ed., Paris, 1816), and Preller, *Demeter und Persephone* (Hamburg, 1837).

ELEUTHERA, or ALABASTER ISLAND, one of the largest of the Bahamas, and the principal fruit-growing island of the group, in lat. 24° 38′ N., long. 76° 9′ W.; area about 100 sq. m.; pop. in 1851, 3,400. It is of irregular shape, long

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and narrow. The soil is fertile and the climate agreeable. The chief settlements are at Governor's Harbor, the Cove, Wreck Sound, and the Current.

ELEUTHERIA (Gr. ἐλευθερία, freedom), among the ancient Greeks, a festival commemorative of deliverance from the armies of Xerxes. It was instituted after the battle of Platæa (479 B. C.), and celebrated annually at that place in the month Maimacterion, nearly corresponding to our September. At the dawn of day a procession marched through the town, at the head of which trumpeters blew the signal for battle. At midday a chariot was driven toward the altar crowned with myrtle and various garlands, and leading behind it a black bull. In front of the altar the archon of Platæa immolated the bull to Jupiter and Mercury, eulogized the heroes who had fallen at Platæa, and sprinkled the ground with wine. Every 5th year these solemnities were attended by contests, chaplets being the reward of the victors.

ELGIN, a city of Kane co., Ill., on both banks of Fox river, 42 m. N. W. from Chicago; pop. in 1850, 2,359; in 1858, about 4,000. It is a prosperous trading place, being situated at the junction of the Fox river valley and the Galena and Chicago union railroads. It has 2 weekly newspaper offices, a bank, 3 hotels, a grist mill, a distillery, a carriage factory, 2 manufactories of agricultural implements, and several schools and academies. It was settled in 1835.

ELGIN, a S. W. county of Canada West, on the N. shore of Lake Erie, traversed by Otter creek, and bordered by the Thames river; area, about 700 sq. m.; pop. in 1852, 25,418.

ELGIN, formerly MORAY, a maritime co. in the N. of Scotland, bounded N. by Moray frith, extending 40 m. from N. to S., and having a breadth of from 8 to 23 m.; area, 840 sq. m.; pop. in 1851, 38,959. It has a coast line of about 30 m., on which are a few small harbors. With the exception of some broken masses of rock, the surface in this quarter is nearly level, but inland it rises into hills, interspersed with fertile valleys, and diversified by lakes. The Spey, Lossie, and Findhorn, the first and last of which contain salmon, are the chief rivers. Slate and freestone are the only valuable minerals. The climate is mild and dry; the soil of the lowlands is generally fertile, and the hills furnish pasturage for black-faced sheep, cattle, and horses. The staple production is wheat, but oats, potatoes, and turnips are also grown extensively. Less than ¼ of the land is cultivated, and there are still large unenclosed tracts. Corn, whiskey, fish, and timber are the most important exports. The county is traversed by a number of good roads, but has no canals and no railways. Chief towns, Elgin, Forres, Fochabers, and Burghead. —ELGIN, a royal parliamentary and municipal burgh and city, capital of the above county, on the S. bank of the Lossie; pop. of municipal burgh in 1851, 6,337. It is surpassed by few cities of Scotland in the number and interest of its ancient monuments. In former times it was a bishop's see; its cathedral was founded in 1224, and was burned in June, 1390, by Alexander Stuart, commonly called the wolf of Badenoch. Bishop Barr soon after erected in its stead a cruciform church with 3 towers. About the year 1568 the privy council ordered the lead to be stripped from the roof and sold to maintain the soldiers of the regent Murray. The noble structure has ever since been falling piecemeal to destruction. The great central tower and spire, 198 feet high, fell in 1711. The chapter house, a beautiful piece of architecture, in the shape of an octagon, with a groined roof, supported by a handsome column in the centre, and elaborately ornamented, is still entire. As late as the beginning of the 19th century Elgin bore much of the antiquated look of an old ecclesiastical town, but it is now greatly changed. New houses and streets have taken the place of the old; assembly rooms have been fitted up; a neat modern church has been built; and the streets are well swept, drained, and lighted with gas. Gray's hospital or infirmary, an institution endowed with £26,000, occupies an elevated site in the western part of the city. An orphan asylum here was endowed with £70,000. In connection with Banff, Cullen, Inverary, Kintore, and Peterhead, Elgin returns one member to the house of commons.

ELGIN AND KINCARDINE, THOMAS BRUCE, 7th earl of, a British nobleman, born July 20, 1766, died in Paris, Nov. 14, 1841. He passed some time at the university of St. Andrew's, studied law in Paris, and having pursued military studies in Germany, entered the army and rose to the rank of general. His time, however, was mostly passed in diplomatic employments. After having been intrusted with missions to Brussels and Berlin, in 1799 he was sent as envoy extraordinary to Constantinople, when the idea occurred to him of rescuing from time and the Turks and removing to England the celebrated sculptures which are now in the British museum, and bear his name. On his way home he passed into France, where Napoleon detained him as a hostage on the rupture of the peace of Amiens. He was released in 1806, and passed the rest of his life without public employment. He was a Scotch representative peer for 50 years. In 1810 Lord Elgin published in defence of his conduct a 4to volume, entitled "Memorandum on the subject of the Earl of Elgin's Pursuits in Greece."—JAMES BRUCE, 8th earl, son of the preceding, a British statesman, born July 20, 1811. His studies were begun at Eton, and completed at Christchurch, Oxford, where he was graduated in 1833. He was afterward elected fellow of Merton college. He commenced public life as one of the members of parliament for Southampton in 1841, but, ere the year was out, succeeded to the title and estates of his father. In the succeeding year he was appointed governor of Jamaica, and was promoted in 1846 to the more responsible and lucrative post of governor-general of Canada. Under his administration Can-

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ada passed from the ferment of recent insurrection into a state of tranquillity. Through his energy and diplomatic skill the negotiation of the reciprocity treaty with the United States was brought to a successful conclusion in 1854, after which he resigned the office of governor of Canada, returned to England, and received the appointment of lord lieutenant of Fifeshire. In the spring of 1857 he was appointed minister plenipotentiary to Pekin, immediately proceeded to the East, was present at the taking of Canton, and, in conjunction with the French, succeeded by vigorous measures in reducing the Chinese to terms. After signing a treaty with the Chinese commissioners at Tientsin, July 26, 1858, the conditions of which were highly favorable to the British, he sailed for Japan, boldly entered the harbor of Jeddo, from which foreigners had always been rigidly excluded, obtained important commercial privileges for his countrymen, concluded a treaty with the Japanese, Aug. 26, and in May, 1859, returned to England. Lord Elgin has been twice married, his second wife being the daughter of the earl of Durham, former governor-general of Canada.

ELGIN MARBLES, a collection of ancient sculptures, chiefly taken from the Parthenon at Athens, now deposited in the British museum. They derive their name from the earl of Elgin, who, while British ambassador at Constantinople in 1799–1802, procured the permission of the Porte to take away from the ruins of ancient Athens "any stones that might appear interesting to him." With the aid of a corps of artists from Italy, and at his own expense (the British government having declined to further the undertaking), he succeeded in the course of 10 years in detaching from the Parthenon, or in excavating from the rubbish at its base, abundant specimens of the various descriptions of sculptures with which it was ornamented. These consisted of 3 kinds: the colossal statues on the tympana of the pediments, the metopes, and the frieze around the cella. Of the first, the Elgin collection contains statues or fragments of statues from both pediments, those from the eastern, on which was represented the birth of Minerva, being the best preserved, while those representing the contest of Neptune and Minerva for the possession of Attica are chiefly torsos and fragments, procured by excavation. Of the 92 metopes, it contains 15 from the S. side of the building, representing in high relief the combats of the Centaurs and Lapithæ, and a cast from another now in the Louvre. The slabs from the frieze of the cella, representing in low relief the great Panathenaic procession, are the most numerous and the best preserved of all the specimens in the collection. In addition to these, Lord Elgin procured, from the ruins about the Athenian Acropolis, the colossal statue of Bacchus from the choragic monument of Thrasyllus, one of the caryatides from the temple of Pandrosus, a portion of the frieze from the Erechtheum, and fragments of the columns of the Parthenon and Erechtheum; beside numerous inscriptions, including that commemorating the Athenians who fell at Potidæa; urns, &c., taken from various parts of Athens and its neighborhood. The first instalment of these treasures of antiquity arrived in England in 1808, and excited a feeling of admiration and delight, not unmingled, however, with indignation at what was considered the Vandalism of Lord Elgin in removing them from their original resting place, or with doubts as to their artistic value. It was said that he had spent much time and money in procuring indifferent Roman marbles of the time of Hadrian, and the project of purchasing them for the nation was strongly opposed. Lord Byron is said to have carried his feeling on the subject of the alleged depredations of Lord Elgin to such an extent, that on a visit to the Parthenon he inscribed in a conspicuous place: *Quod non fecerunt Gothi, hoc fecerunt Scoti.* Among those who urged upon government the purchase of the marbles was the painter Haydon, whose style received its direction from the contemplation of them, and to whose earnest pleas with men in power was partly attributed the offer of £30,000 for the entire collection, made by Mr. Perceval, the premier, in 1811, which, however, was refused. In 1812, 80 additional cases arrived in England, a number of valuable marbles having previously suffered shipwreck, and in 1815 Lord Elgin offered to make over the collection to the nation for a reasonable sum. In the succeeding year the purchase was effected for £35,000, the actual outlay having exceeded £50,000. The services of Lord Elgin in bringing within the reach of artists, as well as in preserving from the ravages of time, these masterpieces of antiquity, are now fully appreciated; subsequent events having shown that, had he not removed them, the greater part would have been long since destroyed. In the war of Greek independence, and especially in the last siege of Athens in 1826–'7, the Parthenon suffered very serious damage. The Elgin marbles, executed by Phidias or under his direction, exhibit the highest development of Greek art in the maturity of its splendor. As types of beauty they have never been surpassed, and even in their present fragmentary and mutilated condition they afford models of form which the utmost efforts of modern art have not been able to equal. Many casts have been taken from them, of which the free academy of the city of New York possesses a set, and under their influence a national school of sculpture has been established in England.

ELI, judge of the Hebrews immediately before Samuel. He was of the race of Aaron, and officiated as high priest and judge during 40 years; yet he lacked the power to discipline his own family, and a train of woes befell him and his house during the latter years of his life. His piety was exemplary, but his indolence was a source of calamities. After a bloody and disastrous battle with the Philistines, in which

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his two sons were slain, and the ark of the Lord was captured, Eli, when hearing the last news, fell back from his chair and broke his neck, at the age of 98.

ELIAS. See ELIJAH.

ELIAS LEVITA (Heb. *Halevi*, the Levite), a learned rabbi and Hebrew author, born at Neustadt in Franconia, or according to some in Italy, in 1472, died in Venice in 1549. He was teacher of Hebrew in Padua from 1504 to 1509, whence he went to Venice and subsequently to Rome. He lost all his property in the sack of Rome by the French in 1527, but enjoyed a reputation for learning and social qualities which enabled him to number bishops and cardinals among his pupils, and made his society sought by princes. He excelled as a critic, grammarian, lexicographer, and poet, and his works were translated and very widely read. Among these were several Hebrew grammars, of which his *Bachur* is the most celebrated, the lexicographical *Tishbi*, and the "Masora of the Masora," the standard book on Hebrew punctuation.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE, a French geologist, born at Canon, Calvados, Sept. 25, 1798. In 1821 he undertook, by order of the government, a series of metallurgical explorations, and was made on his return in 1824 a mining engineer. In 1829 he became professor at the school of mines, in 1832 at the college of France, and engineer-in-chief in 1833. After the death of François Arago he was made perpetual secretary of the academy of sciences. Napoleon III. appointed him senator. He was appointed in 1823, together with Dufrénoy, to aid M. Brochant de Villiers in preparing the materials for the geological map of France; and in this commission they were charged to visit England, where a similar work was in progress, and at the same time to examine the metallurgical operations there practised, and collect full details, the knowledge of which might aid in developing the same branches of industry in France. The results of their investigations were published by Dufrénoy and Élie de Beaumont, in a work entitled *Voyage métallurgique en Angleterre* (1827), illustrated with numerous plates, and afterward enlarged with the aid of MM. Léon Coste and Perdonnet. Élie de Beaumont now devoted himself almost exclusively to geological researches, while engaged upon the preparation of the map of France, and published frequent papers in the *Annales des mines* and other scientific journals. In his *Notice sur les systèmes des montagnes* (1852), he endeavored to prove that mountain chains are to be classed according to the direction of their range, all those lying parallel with the same great circle of the earth, wherever they may be found, having been uplifted suddenly during the same geological epoch. The uplifting, he contended, was caused by the movement resulting from the contraction of the crust of the earth in the course of the secular refrigeration of the planet. These violent effects thus produced were only occasionally exhibited in the long history of the globe during short periods of disturbance which succeeded the more extended periods of repose. In the latter were deposited the sedimentary rocks of the peculiar types of the period, inorganic and organic, and every change to another series of rocks was evidenced by the formation of chains of mountains having a different direction from those which preceded them. Further, those stratified rocks of the same epoch must have the same direction or strike. He described in the last edition of his work the features of no less than 95 systems of mountains; and the facts he collected added largely to the geological knowledge of the day.

ELIJAH, a Hebrew prophet, whose history is given in the last chapters of the 1st book of Kings, and in the opening chapters of the 2d. According to this he suddenly appeared before King Ahab, declaring that as a punishment for his iniquities neither dew nor rain should fall for years, until he himself announced the change. He took refuge from the wrath of the king in the desert, by the brook Cherith; and after the drying up of the brook he proceeded to Zarephath, where he was supported by a poor widow, for whom his presence was a source of blessings during the distresses of the time. After drought and famine had desolated the country during 3 years, he reappeared to the king, offering to demonstrate the vanity of the worship of Baal. He challenged the idolatrous priests, 850 in number, who had followed in the train of Queen Jezebel, to meet him upon Mt. Carmel, and defied them to make fire fall from heaven to consume their sacrifice. The long prayers of the Baalites were without success, but on Elijah's short prayer the fire came down and consumed not only the bullock but the altar. The people instantly massacred the priests, and then Elijah promised an end to the famine, and there was an abundant rain. But Jezebel swearing revenge for the destruction of the priests, Elijah again fled to the wilderness of Mt. Horeb and hid himself in a cavern. Then he was commanded to return and anoint Hazael king over Syria, Jehu over Israel, and Elisha prophet in his own place. On his way he found Elisha and made him his disciple, and as he appeared again before Ahab, guilty of the blood of Naboth, the king humbled himself and repented. Ahaziah, his son, who succeeded to the throne, fell ill, and Elijah announced to him through his agents that his sickness would end in death. Ahaziah sent a captain and 50 armed men to seize Elijah; but fire from heaven consumed the band. A second company met with the same fate. At length he appeared personally before the king and repeated his announcement. His mission was now accomplished. He made a visit to the school of the prophets at Bethel, and having, in company with Elisha, crossed the Jordan, the waters of which he divided by smiting them with his mantle, he was taken up into heaven by a whirlwind, in a char-

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lot of fire drawn by horses of fire. The date of this event is fixed in the early part of the 9th century B. C.

ELIMINATION (Lat. *eliminare*, to turn out of doors), the separation and exclusion of some particular substance from a compound, or of some particular symbol from an algebraic expression, thus simplifying the compound or expression, and rendering it capable of further analysis and use.

ELIOT, JOHN, commonly called the "Apostle of the Indians," an American clergyman, born in Nasing, England, in 1604, died in Roxbury, Mass., May 20, 1690. He was educated at Cambridge, was for some time an instructor of youth, and in 1631 came to Boston, Mass., where he preached to the church of Mr. Wilson, who was then in England. In 1632 he was settled as teacher of the church in Roxbury, where he remained to the end of his days. Being impressed with the benighted condition of the Indians, whom he fancied to be the descendants of the lost tribes of Israel, and the legislature having passed an act for the propagation of the gospel among them, he commenced preaching regularly to them in their own language at Nonantum, now a part of Newton. He had acquired their language through the assistance of an intelligent Indian servant in his family who had learned English. The first service was held Oct. 28, 1646. After prayer he addressed them in a sermon, in which he stated the leading doctrines of Christianity, and applied them to their condition, inviting his hearers at the close to ask any questions that might occur to them. One asked whether God could understand prayers in the Indian language; another, how could there be an image of God since it was forbidden in the 2d commandment; another, how the Indians could differ so much from the English in their views of religious truth if they all at first had but one father; another, how came the world so full of people if they were all once drowned in the flood. The conference lasted 3 hours, and was followed by others in which similar queries were propounded by the Indians, one of whom, very aged, inquired, with tears, whether it was too late for such an old man as he to repent and be saved. Eliot was strongly opposed by some of the sachems and conjurers, who threatened him with violence if he did not desist from his labors; but his answer was: "I am about the work of the great God, and he is with me, so that I neither fear you, nor all the sachems in the country. I will go on; do you touch me if you dare." A settlement of "praying Indians" was soon formed at Nonantum, which in 1651 was removed to Natick, where in 1660 an Indian church was organized, and the community flourished for many years. Eliot travelled extensively, making missionary tours every fortnight; planted a number of churches; visited all the Indians in the Massachusetts and Plymouth colonies, and once preached the gospel to the famous King Philip, who rejected it in disdain. In these labors of benevolence he cheerfully encountered both dangers and hardships. In one of his letters he says: "I have not been dry night or day from the third day of the week unto the sixth, but so travelled; and at night pull off my boots, and wring my stockings, and on with them again, and so continue; but God steps in and helps." He induced large bodies of Indians to give up their savage customs and habits, and form themselves into civilized communities; led many persons to engage in the missionary work among them, and lived to see no fewer than 24 of them become preachers of the gospel to their own tribes. His influence over the Indians was almost unbounded. He protected them in 1675, during Philip's war, when some of the people of Massachusetts had resolved to extirpate them; and though he suffered much abuse for the part he took, nothing could shake his faithful friendship for them. At the age of 80 he offered to give up his salary from the church in Roxbury, and desired to be released from his labors as their teacher; and when, from increasing infirmities, he could no longer visit the Indians, he persuaded a number of families to send their negro servants to him every week, that he might instruct them in the word of God. His declining years were without pain or disease. Mr. Eliot was one of the most laborious and useful ministers of his day; his discourses, unlike those of most preachers of the time, were direct and free from pedantry, and everywhere acceptable. In all circumstances his first inquiry was, how he might do some good to those about him. His manner of living was very simple. He allowed himself but little sleep; a single plain dish furnished his ordinary repast. He gave to the Indians most of his annual salary of £30, which he received from the society for propagating the gospel; and it is related that on one occasion, when the parish treasurer was paying him, he tied the ends of the handkerchief into which he put the money in as many hard knots as possible, to prevent Mr. Eliot from giving it away before he should reach home. Calling at once, however, on a family suffering from sickness and want, he told them God had sent them relief, and began to untie the knots; but becoming impatient, he gave handkerchief and all to the mother, saying: "Here, my dear, take it; I believe the Lord designs it all for you." Among Mr. Eliot's peculiarities was a deep-rooted prejudice against wigs and long hair, preaching and praying vehemently against both, and attributing to them the evils under which the country suffered. He had the same strong aversion to the use of tobacco, and denounced it in the severest terms. Richard Baxter said of Mr. Eliot: "There was no man on earth that I honored above him." All New England bewailed his death as a great and general calamity; and Cotton Mather tells us: "We had a tradition that the country could never perish as long as Eliot was alive."—A list of the published works of Mr. Eliot may be found in his life, by the Rev. Convers Francis, in Sparks's "American Biography." Among them are ac-

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counts of the progress of the gospel among the Indians; the "Christian Commonwealth," published in England about 1660, which, when received in Massachusetts, was regarded as seditious, so much so that the governor and council required Mr. Eliot to retract its teachings, because opposed to the monarchy of their native country; an Indian grammar (1664); the psalms translated into Indian metre (1664); and a harmony of the Gospels, in English (1678). His great work, however, was the translation of the Bible into the Indian tongue; the New Testament was first published in 1661, and the Old in 1663; and both were issued in subsequent editions. This work was published at Cambridge, and was the only Bible printed in America until a much later period. The longest single word in it is "Wutappesittukqussunnoohwehtunkquoh," signifying "kneeling down to him," in Mark i. 40; which illustrates the jest of Cotton Mather, who said he thought the words of the language must have been growing ever since the dispersion at Babel.—JARED, grandson of the preceding, and minister in Killingworth, Conn., born Nov. 7, 1685, died April 22, 1763. He was an able and constant preacher, a botanist, and a scientific and practical agriculturist, was the first to introduce the white mulberry tree into Connecticut, and discovered a process of extracting iron from ferruginous sands. He was also regarded as the first physician of his day in the colony; and such was his success in the treatment of insanity and chronic complaints, that he was sometimes sent for to Newport and Boston, and was more extensively consulted than any other physician in New England. In his multiplied pursuits his judgment seemed always good, and his success almost unfailing.

ELIOT, JOHN, D.D., an American clergyman, born in Boston, May 31, 1754, died there, Feb. 14, 1813. With his friend Dr. Belknap he coöperated in establishing and sustaining the "Massachusetts Historical Society," to the publications of which he contributed many valuable papers. He was much engaged in biographical and historical researches, and in 1809 published his well-known "New England Biographical Dictionary." He also published a number of sermons on different occasions, and several memoirs of distinguished persons.

ELIOT, SAMUEL, an American author, born in Boston, Dec. 22, 1821, a son of William Havard Eliot, and grandson of Samuel Eliot, who founded the Eliot professorship in Harvard college. He was graduated at Harvard college in 1839, with the highest honors of his class, though one of the youngest members. Having decided upon a life of business, he passed 2 years in a counting room in Boston, after leaving college; but he abandoned his original purpose at the end of this period. The next 4 years were spent by him in foreign travel and in studies abroad. In Rome, in 1845, he formed the plan of writing a history of liberty, and began upon it. For some years after his return he resided in Boston or its immediate neighborhood, engaged in literary labor, but also giving much time and thought to the business of practical teaching. Beside private pupils, he gave gratuitous instruction to classes of young working men, and organized a charity school for vagrant children. His first publication, a small volume, produced in Boston in 1847, entitled "Passages from the History of Liberty," traced the career of Arnold of Brescia and other early Italian reformers, of Savonarola, of Wycliffe, and touched upon the war of the communities in Castile. The first portion of the elaborate work to which he had chiefly devoted himself, appeared in 2 vols. 8vo. in New York in 1849, entitled "The Liberty of Rome." A second revised edition appeared in Boston in 1853, entitled "The History of Liberty. Part I. The Ancient Romans." In the same year was published in Boston a further portion of the same work in 2 vols. 8vo., called "The History of Liberty. Part II. The Early Christians." The author is now engaged upon a third part of this work, in which he will treat of the history of liberty during the papal ages. These histories are characterized by great depth and patience of research, a philosophical method, and a reverential and religious tone; but they are not popular either in essence or in form, and they have not received from the general public the attention which their substantial merits deserve. In 1856 he published in Boston "A Manual of United States History, 1492–1856," a carefully prepared work, distinguished for fidelity of research and condensed clearness of statement. Mr. Eliot has also been an occasional contributor to the periodical literature of the country. He is at present professor of history and political science in Trinity college, Hartford. A man of earnest religious faith, he believes that education in America needs a stronger infusion of the religious element, and his life, his writings, and his practical teachings in his department, are shaped and colored by this ruling idea.

ELIOTT, GEORGE AUGUSTUS, Baron Heathfield, a British general, born in Stobbs, Roxburghshire, Scotland, in 1718, died in Aix la Chapelle, July 4, 1790. He was educated at the university of Leyden, and subsequently studied the art of war at the celebrated school of artillery at La Fère. He entered the British army in 1735, and from that period until the close of the 7 years' war was actively employed at home and abroad, showing equal capacity as an officer of cavalry, of engineers, and of the staff. He distinguished himself greatly at Dettingen, and many other actions in Germany and the Netherlands, at the head of his celebrated regiment of light horse. After the peace he obtained the rank of lieutenant-general, and in 1775 was appointed governor of Gibraltar, the defence of which place for more than 3 years against the combined French and Spanish forces was the chief exploit of his life, and one of the most memorable events in military annals. During the grand attack (Sept. 13, 1782), several hundred pieces of heavy ord-

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nance were directed against the fortress, beside the batteries of 47 ships of the line, of 10 battering ships of peculiar construction and great strength, and of innumerable frigates and gunboats; but owing to the exertions of Gen. Eliott the enemy were beaten off with immense destruction of life and ships, and with but trifling loss to the besieged. On his return to England he received the thanks of both houses of parliament, and was made a knight of the bath by George III.; and on July 6, 1787, he was raised to the peerage as Baron Heathfield of Gibraltar, and a pension was settled on him and his successor.

ELIQUATION (Lat. *eliquo*, to melt), the method of separating metals from each other by melting out the more fusible at temperatures below the melting point of another with which they may be alloyed. It was formerly largely practised in assaying, particularly in separating alloys of copper and silver. Lead was first melted with them, and the mixture being then carefully remelted upon an inclined iron plate, the lead first melted and flowed down a channel in the plate, leaving the copper behind. The silver was afterward easily separated from the lead by cupelling. (See Assaying.)

ELIS, or Elea, in ancient Greece, a country of the Peloponnesus, extending along the Ionian sea from the promontory Araxus to the river Neda; greatest breadth about 35 m., from the promontory of Chelonatas to the foot of Mount Erymanthus, where the boundaries of Elis, Arcadia, and Achaia come together; area, about 1,000 sq. m. It contained the western slopes of the Achaian and Arcadian mountains, Erymanthus Pholoe, and Lyceus, and though its surface was for the most part uneven, it had many valleys and hillsides of great fertility. Its principal rivers were the Alpheus and the Peneus. The whole territory included 3 districts: Elis, in its narrower sense, or Hollow Elis; Pisatis, separated from the first by an arm of the Pholoe mountains; and Triphylia, lying S. of the Alpheus. Of these, Hollow Elis, so called from its being a vale set in a circle of mountains, was the most northern and the most fertile. Here, and nowhere else in Greece, grew the flax called *byssus*, as fine but not as yellow as that of the Hebrews, as was remarked by Pausanias. At the time of the Doric invasion, Oxylus led the Heraclidæ south by the more difficult way of Arcadia, lest they should see and be attracted by the richness of this plain. Hollow Elis never contained more than 3 cities, Elis, with its harbor Cyllene, and Pylus. These were unwalled, and protected only by the sanctity of the country, which by the common law of Greece was regarded as inviolable, on account of its possession of the temple of the Olympian Zeus on the banks of the Alpheus. Here, once in every 4 years, all the states assembled for religious games. This sacred character of Elis was, however, disregarded during the Peloponnesian war by the Athenians. Afterward King Agis of Sparta pressed across the Larissus to attack Elis, but on the first attempt fled alarmed by an earthquake, and failed in a subsequent attack. Cyllene is mentioned in Homer's catalogue of ships, but of the Elean Pylus no sign remains but the name, it having been destroyed even in the heroic times of Greece. Hollow Elis is the scene of the legend of the Augean stables cleansed by the current of the Peneus, which Hercules made to pass through them. The Elean horses, too, were famous for bearing off the Olympic prizes, and merited the praises of Pindar. Pisatis, which was the lower valley of the Alpheus, had 8 cities, 2 of which, Pisa and Salmone, are celebrated in the legends of Œnomaus, Pelops, and Salmoneus. From the time of the Doric invasion there was hostility between the proper Eleans and the Pisatians, caused by the claim of the former to direct the Olympic games. This jealousy gave rise to several wars and alternations of supremacy. The Eleans, finally victorious in the 50th Olympiad, destroyed the city of Pisa. In this district was Olympia, the seat of the most famous of the Greek games, and the quaternial scene of the most splendid of Greek assemblages. Triphylia, the smallest and the southern division of Elis, was separated from Messenia by the Neda, and was fertile only in the interior. Here was Mount Minthe, the highest in Elis, one of the seats of the worship of Hades. Some of the cities of Elis hardly yielded to Corinth and Sparta in the magnificence of their monuments and temples. The Eleans took part in the Trojan, Peloponnesian, and the other general Grecian wars, and were almost constantly in strife with some one of their neighbors. They retained the celebration of their renowned Olympic games till A. D. 394, when the festival was abolished by the emperor Theodosius. Two years later the country was laid waste with fire and sword by Alaric. Again in the middle ages Elis became of some importance in the hands of French adventurers, and subsequently of the Venetians. But the memory of its ancient religious character, and traditions of its cultivation and large and active population, give to it its only modern interest.

ELISABETGRAD, Elisavetgrad, or Yelisavetgrad, a fortified town of S. Russia, in the government of Cherson, 130 m. N. from the town of that name; pop. about 10,000. It is situated on the river Ingul, is the capital of a circle of its own name, is hexagonal in shape, fortified and well built, is the headquarters of the military colonies E. of the Bug, contains a large hospital and 5 churches, has considerable trade, and the principal annual fair in the government. It was founded in 1754, and named after the empress Elizabeth.

ELISHA, son of Shaphat, a Hebrew prophet, whose history is given in the 2d book of Kings. He was ploughing with 12 yoke of oxen, when Elijah, returning from Horeb, called him to the prophetic office. At the moment when Elijah disappeared from the earth, Elisha received his mantle, and was recognized by the other proph-

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ets as their spiritual chief. He divided the waters of the Jordan by extending over them the robe of his master, rendered the bitter fountain of Jericho sweet by casting salt into it, cursed the children of Bethel, who mocked him, and were devoured by 2 bears, predicted the victory of Jehoram and Jehoshaphat over the Moabites, restored the fortune of a widow persecuted by her creditors, raised to life the son of a woman of Shunam who had given him hospitality, and cured the leprosy of Naaman. He defeated all the projects of Benhadad, king of Syria, against Israel, caused the host sent to capture himself to be smitten with blindness, and having shown them how easily he could destroy them, dismissed them, astonished at his power and moderation. Samaria being reduced to extreme famine by siege, Elisha predicted incredible abundance, which was suddenly obtained by the panic and flight of the Syrian army, leaving their tents filled with gold and provisions. He foretold the death of Benhadad, and the succession of Hazael, his murderer. Upon his deathbed he was visited by King Joash, to whom he promised 3 victories over the Syrians. His death is fixed in the latter part of the 9th century B. C.

ELIXIR (Lat. *elixo*, to boil, or perhaps a word of Arabic origin), applied in old pharmacy to certain extracts obtained by boiling, as elixir of vitriol, a mixture of sulphuric acid with some aromatic tincture; and in modern pharmacy the name is retained for various tinctures made up of several ingredients. The alchemists applied it to a number of solutions they employed in the transmutation of metals.

ELIZABETH, a city, capital of Union co., N. J., on Elizabethtown creek, 2½ m. from its entrance into Staten Island sound, and 5 m. S. W. from Newark; pop. in 1855, 8,978. It is regularly built on high ground with straight streets, shaded with trees, and contains a number of excellent schools, the county offices, a bank, a newspaper office, several large manufactories, and 12 churches, viz.: 1 Baptist, 3 Episcopal, 3 Methodist, 3 Presbyterian, and 2 Roman Catholic. Vessels of 300 tons can reach Elizabethport, 2½ m. from the city, at the mouth of the creek, and near the entrance of Staten Island sound into Newark bay, and vessels of 30 tons can ascend to Elizabeth. The New Jersey central and the New York and Philadelphia railroads pass through the city. It was settled in 1665, and was long the capital and chief town of the state. It was formerly called Elizabethtown.

ELIZABETH, second queen regnant of England, and last sovereign of the Tudor line, daughter of Henry VIII. and Anne Boleyn, born at the palace of Greenwich, Sept. 7, 1533, died March 24, 1603. She was virtually made heiress presumptive to the throne immediately after her birth, by act of parliament, to the exclusion of her sister Mary, daughter of Catharine of Aragon, who was more than 17 years her senior. The king, though bitterly disappointed in the sex of the child, showed attachment to her, and interested himself in her education. He purposed wedding her to the 3d son of Francis I. of France. In her 3d year her fortunes were clouded by the occurrence of that tragedy which sent her mother to the scaffold. Elizabeth was in her turn declared illegitimate, and fell into contempt. The birth of her only brother, afterward Edward VI., happened in 1537, and her first public act was to bear the chrism at his christening, she being herself carried in the arms of Lord Hertford. She was educated by Lady Bryan, a superior woman, and early showed talent. To her brother she became attached. With Henry's last 3 wives she was on the best of terms. At 10 years her hand was offered to the earl of Arran, but refused. A marriage between her and Prince Philip of Spain was talked of in 1545. The preceding year she had been restored to her right of succession, but the act declaring her illegitimate was never repealed. She had already become very learned, understanding the Latin, French, Italian, Spanish, and Flemish languages. She translated a work from the Italian, and dedicated it to her last stepmother. Her poetry was very good for a princess; but her favorite study was history. She is known to have shared the instruction received by her brother from some of the most learned men of England. Henry dying in Jan. 1547 (N. S.), Elizabeth found herself, by his will, the next person in the order of succession to Mary, and in other respects liberally provided for. Lord Seymour of Sudley, an uncle of the king, endeavored to get her for his wife; but he failed, and married Catharine Parr, Henry's last wife, at whose instance Elizabeth had rejected him. Her studies were continued, and she became the pupil of Roger Ascham, on the death of William Grindal, when she was 16. With him she read in Latin the works of Livy and Cicero, and in Greek those of Sophocles, the select orations of Isocrates, and the New Testament. Elizabeth was residing with her stepmother, and the freedom she allowed Lord Seymour caused much scandal, and led to her removal to Hatfield. After his wife's death, Seymour renewed his acquaintance with Elizabeth, but his arrest and execution on the charge of treason prevented the success of his designs. Elizabeth, on hearing of his death, merely said that there had died a man of much wit and very little judgment—words which accurately describe the man. Her reputation, however, suffered severely, and the most scandalous stories were current respecting her and Seymour. It is certain that she long cherished a regard for his memory. An attack of illness endangered her life, and led to her being better treated, though she was not allowed to see the king, whose affection for her was unbroken. In 1551 she was restored to favor. She was now regarded as being in some sort the rival of Mary, and as the chief person in the Protestant party, as Mary was at the head of the Catholics. The plan of Dudley, duke of Northumberland, to exclude both ladies from the throne, and to secure it for Lady Jane Grey, whom he had caused to

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marry one of his sons, put an end to this rivalry. The king was Northumberland's tool, and was not allowed to see Elizabeth in his last days. He is supposed to have been completely estranged from her. On his death, the duke offered Elizabeth a large sum of money, and a valuable grant of lands, if she would acquiesce in the new order of things; but she referred him to Mary, during whose life she had nothing to resign. She did not raise a force to aid Mary, as it was not in her power to do so, but joined her soon after her success, in 1553, at the head of a body of troops. They were on the best of terms, but in a month they became enemies. Mary's stubborn fidelity to the old faith offended many of her subjects, who looked to Elizabeth as their future sovereign, the queen having passed middle life, and being single. Their relative positions were sufficient to cause enmity between them, and Elizabeth's refusal to attend mass offended the sovereign and her Catholic advisers. After much quarrelling, the princess affected to give way, and attended the queen at mass. Her object was to have her right to the succession admitted at the coronation, in which she succeeded. The sisters needed each other's support. The estrangement, however, was renewed, when an act of parliament was passed, declaring valid the marriage between Henry VIII. and Catharine of Aragon, from which Elizabeth's illegitimacy followed, though it was not set forth in words. A conspiracy is supposed to have been formed for the overthrow of Mary's government, and the marriage of Elizabeth to Courtenay, earl of Devonshire. Mary consented to her sister's request that she might retire to the country, but withdrew the favor, and ordered Elizabeth to remain in the palace, and affronted her on the point of precedence. On this, Elizabeth refused to go to the royal chapel, and remained in her chamber. Grave accusations were preferred against her, but she disproved them, a reconciliation was effected, and she was allowed to go to the country. Here she refused to marry the duke of Savoy, and also declined the hand of the prince of Denmark. The conspiracy to elevate her and Courtenay to the throne having become known to the government, those engaged in it rose in rebellion, and Mary ordered Elizabeth to return to court. On the plea of illness she did not comply. Wyatt's rebellion was put down, and some of the rebels accused her of being in the plot, while there were other circumstances that bore against her. A royal commission was sent to remove her to London, which was done, though she was very ill. She was lodged at Whitehall, Mary refusing to see her. The royal councillors were divided, some being in favor of her execution, while others were more merciful. Finally she was sent to the tower, March 17, 1554, where she was examined. She was forced to hear mass. Wyatt exonerated her on the scaffold of being privy to his intended rebellion, but his language was ambiguous, and there seems little reason to doubt her complicity in the plot. The ambassador of Charles V., anxious for the interests of Philip, Mary's intended husband, warmly urged Elizabeth's execution. Mary, whose conduct throughout was not unkind, and who behaved with singular moderation for a crowned head of those times, would not listen to his entreaties, and soon gave orders for her sister's removal from the tower. Elizabeth was sent to Woodstock, where she remained in detention for some time, and professed herself a Catholic. The queen was married in July, 1554, to Philip II. of Spain, and her belief that she was to give an heir to the crown had a good effect on Elizabeth's fortunes; she was now taken to London, had an interview with Mary, and appeared publicly at court. Though treated with much respect, she was not made free until some months later, returning to Woodstock, and sent thence to Hampton court. Her liberation is attributed to Philip, and she was allowed to reside at Hatfield, but with a sort of keeper in her household. She was visited by the queen, and went herself to court. The object of many plots, her life continued to be unpleasant, and at one time she thought of flying to France. Overtures of marriage were made to her from various quarters, but she would not listen to them. Philip, who now treated her with marked friendship, on politic grounds, was anxious that she should marry his friend Philibert of Savoy, but all his endeavors were fruitless, and he could not prevail upon his wife to coerce her sister's inclinations. Mary and Elizabeth were on good terms during the last months of the former's life. The queen, anticipating her husband's request, declared Elizabeth her successor, shortly before her death, exacting, however, a profession of adherence to the old religion. Affecting to feel hurt that her Catholicism should be doubted, the princess "prayed God that the earth might open and swallow her alive, if she were not a true Roman Catholic." She declared that she prayed to the Virgin, and on the day before she became queen the Spanish ambassador wrote to his master that she had told him that she acknowledged the real presence in the sacrament. Mary died Nov. 17, 1558, and Elizabeth ascended the throne without opposition. Cecil was appointed her principal secretary of state, and Nicholas Bacon lord keeper. The queen continued to conform to the Catholic worship until Christmas morning, when she took the final step that placed her at the head of the Protestant world, by refusing to hear mass in the royal chapel. Other changes were made, but her coronation was according to the forms of Catholicism. She sent friendly messages to Protestant sovereigns, and directed her minister at Rome to assure Paul IV. that no violence should be done to the consciences of Englishmen; but the pontiff made only sharp comments on the message, declared she was not legitimate, and required her to submit her claim, as against that of Mary Stuart, to his arbitration. She recalled her minister, whom the pope frightened into staying at Rome under the threat of excommunication. A bull was issued against Elizabeth soon after, though she was

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not expressly named in it. The religious change went on, though Elizabeth was averse to innovations, and would have preferred to proceed so slowly as to have virtually kept things in the state she had found them. Catholic and Protestant services were even ludicrously mixed up in her public worship. This could not last, and 13 bishops were deprived of their sees by parliament for refusing to take the oath of supremacy. The church of England was restored, and the use of the Bible in English was legalized. Philip of Spain sought her hand, and wrote to her often; but though she played her game with much skill, England being in a very depressed state, she would not accept the offer. Parliament formally acknowledged her title without any allusion to her mother; but she never vindicated her mother's name and fame, which has been a significant fact in the way of those who have supported Anne Boleyn's cause. Elizabeth's conduct was purely political, and it should be recollected that she had never known her mother at a period of life when it is possible to form durable affections. By the treaty of Cateau Cambrésis (April, 1559) peace was restored, France agreeing to give up Calais in 8 years. It was not until 6 months after her accession that the Catholic service was finally discontinued in Elizabeth's private chapel. At first she would not take the title of head of the church, assuming that of its governess; but at a later period she became less discriminating, and asserted her supremacy arbitrarily. Many princes and nobles continued to sue for her hand; and it shows how different was opinion then from what it now is, that even a plain knight, Sir William Pickering, a man of good talent but moderate means, was seriously spoken of as her husband. In France the English throne was claimed for Mary, queen of Scots, wife of Francis II.; a foolish pretension, destined to have bloody consequences. Elizabeth early began that systematic interference with Scotch affairs which lasted during her entire reign, making of Scotland an English province in fact. The party of the reformation was enabled to triumph there through her aid. Pius IV., a new pope, sought to win the queen back to the church of Rome by gentle means, but unsuccessfully. She restored the currency to sterling value in 1560, a reform that did much to promote the prosperity of her subjects. Aid in money, arms, and men was sent to the French Huguenots, and secret assistance to the Protestants of Flanders. When the queen of Scots sought a safe passage from France to her kingdom, Elizabeth refused her request, and it is believed that she endeavored to seize her person. In 1563 parliament entreated the queen to marry, the question of the succession being one of much interest to all classes of her subjects, who had not yet got free from the terror caused by the wars of the roses. Candidates for her hand continued to spring up, at home and abroad. The most prominent Englishman who aspired to the honor was Henry Fitzalan, last (and 18th) earl of Arundel of that name, a man of nobler lineage than her own. Though she was entreated to acknowledge Mary Stuart as her heiress presumptive, she would not do so, and the question was left open, to the grief of the people. The expedition she sent to France failed. She recommended Lord Robert Dudley as a husband to Mary Stuart, before he had been made earl of Leicester, though his object was to marry herself. She was offered the hand of Charles IX. of France, but though pleased with the offer she would not accept it. Another suitor of the highest rank was the archduke Charles, son of the German emperor. Leicester approved of this match. The fortunes of this new noble were rapidly rising, and though he and the queen occasionally fell out, they were soon reconciled, and to his increased gain. Their intimacy began early, in the days of Elizabeth's adversity, and lasted until the earl's death. He even patronized Cecil, to whom in talent he was so inferior, as well as in solid influence. The intimacy between the queen and the earl caused scandalous stories to obtain currency, which had no other foundation than some imprudent acts could furnish. Being requested by Charles IX. to select two English nobles to be made knights of St. Michael, she named Leicester and the duke of Norfolk. Her marriage with the favorite was expected daily. The marriage of Darnley and Mary Stuart annoyed her; and the birth of a son from that union caused alarm in England, as showing that the crown might pass to a Catholic. Parliament being summoned in Oct. 1566, one of the first acts of the commons was to vote that the bill for supplies should be accompanied by one for the settlement of the succession; for this Elizabeth hotly rebuked them. Even Leicester, whose schemes had been traversed by Cecil, was one of the leaders of the opposition on this occasion. In November she was waited upon by a deputation from both houses, and entreated to marry, or to name a successor. She endeavored to reason them out of their obstinacy, and as to the succession, she said they should have the benefit of her prayers. The commons were stubborn, but the dispute was compromised, the queen taking half the money without naming her successor. At this time she was dabbling in alchemy, believing in the quackery of Dr. Dee, whom she had consulted at the beginning of her reign for an auspicious day for her coronation. She made him chancellor of St. Paul's. The murder of Darnley led to the overthrow of Mary Stuart, and to her flight to England the next year (May, 1568), when she was made Elizabeth's prisoner, in violation of the laws of hospitality and the laws of nations. Mary submitted her case to be tried by English commissioners, who were a packed body, and incapable of deciding justly. The serious internal troubles of England in this reign began with the imprisonment of Mary; and those from without began to assume a critical character about the same time. The asylum England afforded to those who fled from persecution in Flanders offended Spain. The

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English flag was insulted in the gulf of Mexico, and the English minister at Madrid badly treated. The queen retaliated by seizing treasure that had been found in Spanish vessels which had taken refuge in English ports; and when Alva laid an embargo on Englishmen and their property, she arrested all the Spaniards in England, not even excepting the ambassador. She corresponded directly with Philip II., but that monarch took a high tone, and threatened war. The duke of Norfolk had become attached to Mary Stuart, and Elizabeth bade him be on his guard. He was arrested and imprisoned. The great northern rebellion then broke out (1569), headed by the Catholic earls of Westmoreland and Northumberland, but was rapidly crushed by the earl of Sussex, and 800 of the rebels were executed. In 1570 the queen was excommunicated by Pope Pius V., and a copy of the bull was fastened on the gate of the episcopal palace of London, by a Catholic named Felton, who was racked and executed. After the failure of another attempt to get up a marriage between the queen and the archduke Charles, it was proposed that she should marry the duke of Anjou, afterward Henry III. of France, and last of the Valois. When the council was informed of this, one of them observed that the duke was rather young for the queen, which enraged her. In this, as in all her negotiations of a similar character, she does not seem to have been sincere; but it was always a source of anger when any one of her innumerable suitors saw fit to marry some other lady. She opened the new bourse, built by Sir Thomas Gresham, in 1571, and named it the royal exchange. Cecil was now created Lord Burleigh, and made lord high treasurer. Sir Thomas Smith was made principal secretary of state. Hatton now began to attract attention, being high in the queen's favor because of his personal accomplishments and beauty; and her reputation has been assailed on account of her fondness for him. For his good she spoiled the bishop of Ely of much church property, and wrote him a truculent and blasphemous epistle in 3 lines. The French marriage project halting, because of the aversion of Anjou to the mature queen, his mother had the impudence to propose his younger brother Alençon in his place, who was Elizabeth's junior by 22 years, and as hideous in person as he was morally depraved. Anjou affected to change his opinion, and the negotiation was resumed. The parliament of 1571 vexed her much, but she was beaten in her attempts to rule it. The emperor Maximilian II. offered the hand of his son Rodolph to the queen, who was more than old enough to be his mother. Henry of Navarre was also placed at her disposal. But she favored Anjou most, much to his dread; and it was to avoid his open rejection of her hand that she rejected his on religious grounds, according to those who think she was sincere. Philip II. was now engaged in a plan involving the assassination of Elizabeth. With this plot Norfolk and Mary Stuart had some connection, but probably without knowing the viler features of it. It was discovered, and Norfolk was executed. The Alençon marriage project was now resumed. Parliament passed a bill to put Mary Stuart to death, but Elizabeth would not give her consent to it. Meantime, fanaticism in France caused the St. Bartholomew massacre in 1572, which event made the English reformers clamorous for Mary's blood; and while Elizabeth would not consent to the execution of her unlawfully detained prisoner, she agreed to a project for giving her up to her Scotch rebel subjects, who were to murder her in 4 hours after obtaining possession of her person. This villanous business came to nothing, because of the Scotch leaders in it insisting upon conditions to which the English could not agree. Mary was still held in confinement. In 1575 the Dutch offered their government to Elizabeth, whom they respected as descended from Philippa of Hainaut. She did not at first help them, and it was not until 1578 that she agreed to aid them with money and men, on conditions by which she could not lose any thing. When Sir Francis Drake returned from his voyage around the world, Elizabeth visited him on board his ship, knighted him, and shared the spoil he had piratically taken from the Spaniards. Ireland gave her great trouble, and the contest which was waged there by Lord Mountjoy was known among the people as "the hag's war," in bitter derision of the queen. Conspiracies began to multiply around her, naturally having Mary Stuart for their central figure. The Jesuits were conspicuous in these plots, in one of which the Spanish minister Mendoza was implicated, and forced to leave the country. Many persons were executed and others imprisoned. Philip Howard, earl of Arundel, son of the duke of Norfolk, was condemned to death, and died in the tower, after a long imprisonment. An association to protect the queen against "popish conspirators" was formed by Leicester, and was converted into a statute by parliament, which actually prepared the way for the murder of Mary Stuart, should Elizabeth be assassinated in her name. Though she continued to refuse the sovereignty of the Dutch, she afforded them more aid, and honorably banished Leicester to their country, at the head of an army; but the distinctions heaped upon him in Holland greatly offended her. The discovery of Babington's conspiracy proved fatal to Mary Stuart, despite the fact that nothing could be proved against her. Her trial was a serious farce, and had its appropriate ending in the open murder perpetrated at Fotheringay (Feb. 8, 1587). It is now pretty well established that Elizabeth's signature to Mary's death warrant was a forgery, and it is beyond doubt that it was sent to Fotheringay castle without her knowledge or sanction. Burleigh was the sender of it, and the forgery is supposed to have been perpetrated by the order or under the direction of Walsingham. Elizabeth was anxious for Mary's death, and sought to have her privily assassinated, but did not mean to have her openly

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executed. She feared the effect of so bold an act on many accounts, but mostly because of the tendency it would have to encourage those writers and speculators who then argued in favor of the right of the people to dethrone and to punish kings. She also feared its effect on foreign sovereigns. Her ministers' fears were of a different character, and were removed by Mary's murder. They feared that Mary would survive Elizabeth, and either would succeed her, or that her claim would cause a succession war, the traditionary aversion of English statesmen. Angry as she was, Elizabeth dared to punish no one but secretary Davison, who was only a tool of the higher ministers; for not only had foreign affairs assumed a serious aspect, but the killing of Mary was unquestionably a popular act with the ruling classes and party. The Scotch people were enraged, and gladly would have assailed their old enemy; but their king had little affection for a mother whom he never had known, and he expected to be Elizabeth's successor. The condition of France left no room for fear on that side; but the pope and the king of Spain were active enemies. Sixtus V. anathematized Elizabeth, and proclaimed a crusade against her. Philip II. laid claim to the English crown, as legitimate heir of the house of Lancaster, in virtue of his descent from two daughters of John of Gaunt, who had been queens of Portugal and Castile. He made open preparations to enforce this claim, and the pope promised large conditional aid. Meantime, Drake ravaged the coasts of Spain, preyed on her commerce, and made a successful attack on the shipping in the harbor of Cadiz. The English were not backward in preparing to meet Philip's attack. All parties, Catholics and Puritans, as well as the rest of the people, showed a patriotic spirit. A fleet of 180 sail was got ready, commanded by Lord Howard of Effingham, Drake, Frobisher, and Hawkins. Two armies were raised, numbering over 60,000 men. The Spanish armada sailed May 29, 1588, but a storm compelled it to return; and it was not until July 21 that the two fleets met, and joined battle near the English coast. After a series of actions that lasted 18 days the Spaniards were utterly routed, the elements greatly assisting the English. Elizabeth herself is said to have originated the plan of sending fire ships into the Spanish fleet, to which much of the success of the English was owing. The country was thus delivered from present fear of invasion. Leicester died in 1588, after a quarrel with the queen, who had been persuaded by her ministers not to raise him to the post of lord lieutenant of England and Ireland. In 1589, an expedition was sent to effect the liberation of Portugal; but though the army was landed and marched to the suburbs of Lisbon, the undertaking signally failed. Aid in men and money was sent to Henry IV. of France, then contending with Spain and the league, in 1590–'91. A parliament met in 1593, and the commons after some contention with her submitted to the sovereign. The decision of Henry IV. to abandon the Protestant faith annoyed Elizabeth, and she sought to influence his mind to remain firm, but ineffectually. A plot to poison her was detected, and her Jew physician, Lopez, who had been in her service 34 years, was executed for his part in it. Religious persecutions were now common, and several noted Puritans were put to death. The war with Spain was carried on with vigor, and Cadiz was taken in 1596, by a fleet and army commanded by Howard of Effingham and Essex. The latter was now the principal person in England for a subject, but the infirmities of his temper prevented him from profiting fully from his position and the queen's regard. The court was full of intrigues, and Essex, the most generous and imprudent of men, was the victim of all who chose to play upon him. Philip II. having formed a plan to place his daughter on the English throne, Essex was sent to assail the Spaniards at home and on the ocean. He accomplished nothing, which offended the queen; but he soon recovered her favor, and was enabled to beard Burleigh, until the latter discovered that he was in correspondence with the king of Scotland. Henry IV. having resolved upon peace with Spain, to the anger of Elizabeth, offered to mediate a general peace. Burleigh favored this, and Essex took the other side. It was in a consultation on Irish affairs, in the royal closet, that Essex turned his back contemptuously on the queen, who immediately struck him on the head, and told him to "go and be hanged!" After a display of rashness and temper the earl left the presence. While efforts for a reconciliation were making, Burleigh died, Aug. 4, 1598. Six weeks later died Philip II. Essex returned to court, and shortly after was appointed lord deputy of Ireland, which was in a miserable state. The office was given less in love than in anger, and was the gift of enemies. A politician rather than a statesman, and a knight rather than a soldier, Essex failed entirely in Ireland, whence he returned without permission and entered upon that strange course of action that ended in his death on the scaffold, in 1601. The famous story of the ring and the countess of Nottingham has no foundation in truth; nor is it true that the gloom in which the queen's last days were passed was owing to Essex's death. Sir Robert Cecil, a son of Burleigh, was now Elizabeth's most powerful minister, and he was in correspondence with the king of Scotland. The queen sought to have Henry IV. visit her at Dover, he being at Calais, but he contented himself with sending M. de Rosny, later the duke de Sully, as his ambassador. Their interviews were interesting, and in the first she spoke of the king of Scotland as her successor, who, she said, would be king of Great Britain. This title originated with her. Another embassy was sent to England by Henry, and was well received. Elizabeth's last parliament met in Oct. 1601. It made great opposition to the oppressive monopolies she had

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granted, and she gracefully gave way. In the early part of 1603 (N. S.) she suffered from a complication of complaints, but the immediate cause of her death, which took place at Richmond, was a cold. She was buried April 28. Her reign is justly considered one of the most important England has known, and her memory is held in deserved reverence by all classes of Englishmen, and in esteem by the world; for, in despite of many faults of character and errors of conduct, she was a great sovereign. "The Elizabethan age" is one of the most brilliant periods of English history, and the numerous statesmen, soldiers, scholars, and other intellectual personages who then existed, achieved for it a place in the world's annals that has never been surpassed. Of this glory the sovereign has had allowed her far more than her due share, because of the loftiness of her position and the consequences of her actions.

ELIZABETH OF FRANCE, PHILIPPINE MARIE HÉLÈNE, madame, sister of King Louis XVI., born in Versailles, May 3, 1764, guillotined in Paris, May 10, 1794. She early distinguished herself by charity and a taste for serious pursuits, especially botany. When the revolution broke out, she shared her brother's trials and misfortunes, evincing in all circumstances unfaltering firmness, courage, and sweetness of temper. On Oct. 5, 1789, she succeeded in preserving the lives of several of the royal body guard, threatened by the infuriated mob; in June, 1791, she accompanied her brother to Varennes, and sustained his spirit in their dangerous journey back to Paris; on June 20, 1792, when the populace broke into the Tuileries, her life was in danger from being mistaken for the queen; and in all the perils of that period she retained her wonted composure, and thought only of the safety of her brother and his family. She was incarcerated with them in the temple, but was separated from the king on his trial before the convention, and afterward from the queen and the dauphin; and finally, although nothing could be adduced against her except her devotion to her brother, was sentenced to death by the revolutionary tribunal. She met her fate with the patience and intrepidity which had marked all her life.

ELIZABETH OF HUNGARY, saint, countess of Thuringia, daughter of Andrew II., king of Hungary, born in Presburg in 1207, died in Marburg, Germany, Nov. 19, 1231. At 4 years of age she was betrothed to Louis, the eldest son of Hermann, landgrave of Thuringia, and according to the custom of the age was transferred to the household of her future husband, to be educated for her expected rank. The nuptials were celebrated when she had reached her 14th year; and continuing the religious practices for which she had early been remarkable, she enlisted the aid of her husband in the charitable works which engrossed her time. Louis joined the 6th crusade, but died before reaching the Holy Land, and his death at once changed the circumstances of the countess. Her infant son, Hermann, was declared incapable of succeeding to his father's rule; a party was organized in behalf of Henry, brother of the late count; the castle was seized, and Elizabeth with her 3 children was turned out of her home without provision, money, or a change of raiment. After living some time in great destitution, subsisting now by charity and now by spinning, she was sheltered by her aunt the abbess of Kitzingen, until a more suitable asylum was found in a castle offered for her use by her uncle the bishop of Bamberg. Afterward, at the intercession of the friends of the deceased count, Henry recalled her to Wartburg, and acknowledged the rights of her son; but frequent misunderstandings and difference of tastes led her to petition the count for a separate residence, where she might follow a monastic life, and give herself wholly to works of charity. She took up her abode at Marburg in Hesse, where she spent the remaining 3 years of her life in seclusion. She wore beneath her garment the haircloth of St. Francis, bound herself to obey the orders of her confessor, dismissed her favorite maids when she found herself loving them too well, devoted her liberal allowance entirely to the poor, and supported herself by spinning; she ministered to the most loathsome diseases, and even received lepers into her house. Her confessor, Conrad the legate, exercised his functions with the utmost severity; and in compliance with her own wishes, subjected her to unusual and cruel penances. She was buried with great pomp in the chapel near the hospital which she had founded in Marburg, and the report of the frequent miracles wrought at her tomb induced Gregory IX. in 1235 to add her name to the list of saints. Her shrine was for ages one of the most famous of Europe, rivalling those of St. Thomas of Canterbury and St. James of Compostella. The altar steps before it are worn hollow by the knees of pilgrims, and the name of St. Elizabeth of Hungary still remains throughout Germany the synonyme of all that is sweet, tender, and heroic in Christian faith. Her life has been written by many authors, Catholic and Protestant, in many languages. No fewer than 38 published works and 13 MSS. relating her story are catalogued by Count de Montalembert, whose elaborate and enthusiastic biography is accessible to American readers in the translation by Mary Hackett, published in New York in 1854. The best Protestant life of Saint Elizabeth is that of K. W. Gusti, an edition of which was published in Germany in 1835.

ELIZABETH OF VALOIS, or ISABELLA, queen of Spain, born at Fontainebleau, April 13, 1545, died in Madrid, Oct. 3, 1568. She was a daughter of Henry II. and Catharine de' Medici. By the treaty of Angers (July 19, 1551) she was betrothed to Edward VI. of England, but the marriage was prevented by his premature death. By the preliminaries of the treaty of peace of Cateau Cambrésis, her hand was assigned to Don Carlos, infante of Spain. The treaty was ratified, April 3, 1559; but the

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father of Don Carlos, Philip II., being left a widower by the death of his wife, Queen Mary of England, and fascinated by a portrait which he had seen of the French princess, substituted himself for his son. She was united to Philip, Feb. 2, 1560, the marriage ceremony being performed with great splendor at Toledo. She was idolized by the people of Spain, and French as well as Spanish biographers are unanimous in praising her beauty, accomplishments, and virtues. Just before her death she was delivered of a daughter, who lived only to be baptized, and was buried in the same coffin with the mother. Glowing accounts have been given of the relations between Elizabeth and Carlos, but Mr. Prescott in his "History of the Reign of Philip II." proves their groundlessness. Elizabeth took a lively interest in Carlos, and was deeply affected by his tragic end; but, according to Mr. Prescott, her feelings for him were only those of kindness.

ELIZABETH CHARLOTTE, duchess of Orleans, born in Heidelberg, May 27, 1652, died at St. Cloud, Dec. 8, 1722. She was a daughter of the elector Charles Louis of the Palatinate, and so homely that a duke of Courland, who had been betrothed to her, refused to marry her. After embracing Catholicism she became the 2d wife (Nov. 16, 1671) of Philip I., duke of Orleans, brother of Louis XIV. At the French court she became distinguished for her integrity and intellect, as well as for her bluntness and eccentricity. She had a cordial hatred for Madame de Maintenon, and opposed the marriage of her son (the future regent) with Mlle. de Blois, the king's natural daughter. St. Simon gives an amusing account of the energetic manner in which she displayed her feelings on the occasion, by slapping her son in the face in the presence of the whole court. She often attended Louis XIV. to the chase, and the king enjoyed her wit and originality and esteemed her truthful character. Her predilection for the German language and literature increased the intercourse of French with German scholars, especially with Leibnitz, one of her special favorites. Her claims to the Palatinate, however, proved disastrous for Germany, by resulting in the devastation of that country by the armies of Louis XIV. (1688–'93). She wrote various memoirs, which have been several times translated and published in France. Her posthumous letters were also translated from the German, and published by M. G. Brunet in 1853, under the title of *Lettres inédites de la princesse palatine*.

ELIZABETH CHRISTINA, queen of Prussia, born in Brunswick, Nov. 8, 1715, died Jan. 13, 1797. She was a princess of Brunswick-Bevern, a niece of the empress of Germany, and was betrothed to the future Frederic the Great, March 10, 1732. Carlyle, in his history of Frederic (London, 1859), describes her as being at that time "an insipid, fine-complexioned young lady;" and Frederic, who was compelled to marry her by his father, and who was much opposed to the match, said of her in his letters to Gen. Grumkow: "She is not at all beautiful, speaks almost nothing, and is given to pouting." The marriage ceremony, however, was performed at Potsdam, June 12, 1733; and Carlyle says that, "with the gay temper of 18 and her native loyalty of mind, she seems to have shaped herself successively to the prince's taste, and growing yearly gracefuller and better-looking, was an ornament and pleasant addition to his existence." Frederic made generous provision for her, and remarked in his will: "During my whole reign she has never given me the slightest cause of dissatisfaction, and her high moral character must inspire respect and love." She was a lady of considerable attainments, wrote several works, and distributed half of her income among the poor.

ELIZABETH CITY, a S. E. co. of Virginia, bordering on Chesapeake bay at the mouth of James river, bounded S. by Hampton Roads, and N. by Back river; area, 50 sq. m.; pop. in 1850, 4,586, of whom 2,148 were slaves. It has a fertile soil, suitable for grain and potatoes. In 1850 it produced 87,295 bushels of Indian corn, 22,188 of wheat, 17,754 of oats, and 42,579 of potatoes. There were 3 flour and grist mills, 7 churches, and 249 pupils attending public schools and academies. This was one of the 8 original shires into which Virginia was divided in 1634. Capital, Hampton. Value of real estate in 1850, $694,516; in 1856, $974,946, showing an increase of 40 per cent.

ELIZABETH CITY, a post town and capital of Pasquotank co., N. C., on Pasquotank river, 20 m. from its mouth; pop. in 1850 estimated at 2,000. It is one of the principal towns in the N. E. part of the state. It has communication with Norfolk, Va., by means of the river and the Dismal Swamp canal, and exports lumber and various products of the pitch pine.

ELIZABETH FARNESE, queen of Spain, born Oct. 25, 1692, died in 1766. She was a daughter of Odoardo II., prince of Parma, and of the duchess Sophia Dorothea of Bavaria-Neuburg. Her ungainly appearance and headstrong disposition alienated from her the affections of her mother, and her education was neglected; but those who proposed her as a consort to Philip V. in the hope of making her their tool were greatly disappointed. The king of Spain on becoming a widower in 1714 resigned himself to the guidance of the French princess Des Ursins, the favorite of his late beloved queen, and desired to follow her advice in the choice of a second wife. The princess selected Elizabeth on account of her apparent disqualification for an exalted position. But the first act of the new queen was to cause the dismissal of the princess, and she soon gained a complete mastery over her weak-minded husband and over the affairs of Spain. By her ambition and intrigues, and the great schemes of her minister, Cardinal Alberoni, Europe was thrown into confusion. Spain again obtained possession of the Two Sicilies and of Parma and Piacenza. Carlyle, in his "History of Frederic the Great,"

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gives a full description of her quarrels with the emperor Charles VI., and characterizes her as "a termagant, tenacious woman, whose ambitious cupidities were not inferior in obstinacy to Kaiser Karl's, and proved not quite so shadowy as his."

ELIZABETH PETROVNA, empress of Russia, daughter of Peter the Great and Catharine I., born in 1709, died Jan. 9, 1762. After the death of her parents, her nephew, Peter II. (1727–'30), son of the unhappy prince Alexis and her cousin Anna Ivanovna (1730–'40), daughter of the elder brother of Peter the Great, successively occupied the throne of Russia, for which she showed little desire, the pleasures of love, as she used to say, being her supreme good. Anna appointed Ivan, son of Anthony Ulric, duke of Brunswick, a child but a few months old, heir to the crown under the tutelage of his mother Anna, and the regency of Biron, the favorite of the empress. Thus Elizabeth was for a third time excluded from the throne of her father, but even her freedom was now menaced by the jealousy of the mother of the infant czar, who wished to get rid both of the regent and the princess, and advised the latter to take the veil. Under these circumstances her surgeon and favorite, Lestocq, brought about a conspiracy, which being seconded by the favor of the national Russian party, and the intrigues of the ambassador of Louis XV., terminated in a military insurrection, the overthrow of Anna and Ivan, and the proclamation of Elizabeth as empress (Dec. 1741). Anna and her husband, as well as numerous other victims, were punished by confinement, and the young prince imprisoned in the fortress of Schlüsselburg, which he never again left; while the successive favorites of Elizabeth, like herself destitute of character and talent, ruled the court and Russia. Her vanity equalled her gross sensuality; but though sometimes exceedingly cruel and barbarous, she often showed humanity, and even generosity. Subsequently some abler Russians obtained the management of affairs, among them Romanzoff, Bestoujeff, and Woronzoff. Peter, son of her deceased elder sister Anna, duchess of Holstein-Gottorp, was appointed heir to the throne. A war with Sweden was happily conducted, and terminated in the peace of Abo (1743). A plot against her was detected and punished. An army sent to assist the empress Maria Theresa against Frederic the Great contributed to the conclusion of the peace of Aix la Chapelle (1748). Having been cruelly mortified by a sarcasm of the witty Prussian king, Elizabeth allied herself against him with Austria and France in the 7 years' war, and her armies, under Apraxin, Fermor, Soltikoff, and Buturlin, contributed not a little to the distresses of the almost isolated Prussian monarch. They won the battles of Gross Jägerndorf and Kunersdorf, took Colberg, and even occupied Berlin. The death of the empress not only freed Frederic from a dangerous enemy, but also promised to give him in her successor, Peter III., an ardent supporter. The licentious disorder in her court lasted till her death. Razumoffski, successively her servant, chamberlain, and field marshal, finally became her secret husband, and is regarded as the father of 3 of her children. The foundation of the university of Moscow, and of the academy of fine arts at St. Petersburg, is one of her greatest merits.

ELIZABETH STUART, queen of Bohemia, born in the palace of Falkland, near Edinburgh, Aug. 16, 1596, died at Leicester House, London, Feb. 13, 1662. She was a daughter of James I. of England, and a highly accomplished princess. She had many suitors, among whom the most eminent were the young king of Spain, Philip III., Charles Emanuel I., prince of Piedmont, and Frederic, elector palatine; but as a Protestant Frederic was preferred. The marriage was celebrated with great pomp in Whitehall chapel, Feb. 14, 1613. To defray part of the expense of the ceremonies the king levied new taxes to the extent of £20,500. The total expense amounted to about £53,000, exclusive of the bride's portion of £40,000. Her husband was the head of the Protestant interest in Germany, and when in 1619 the crown of Bohemia was tendered to him, she urged his acceptance of it, with the remark that he should not have married a king's daughter if he had not the courage to become himself a king. Her entrance into Prague and her coronation were magnificent pageants, but her sovereignty soon came to an end. The imperialist forces advanced into Frederic's hereditary dominions, and into Bohemia, and after the battle of Prague (Nov. 8, 1620) he and his queen were compelled to flee. A refuge was offered to them by the prince of Orange, at the Hague, where most of her children were born. One of her sons was the prince Rupert, so well known in the history of the English civil wars. Her youngest child, Sophia, afterward electress of Hanover, and ancestress of the present English royal family, was born in 1630, shortly after the birth of her nephew, Charles II. Shortly before her death Elizabeth resided for about 6 months in the house of Lord Craven, whose acquaintance she made after the death of her husband (1632), and with whom she lived on terms of the greatest intimacy. Her charms are celebrated by Sir Henry Wotton, in his famous lines beginning: "You meaner beauties of the night."

ELK, a N. W. co. of Penn., traversed by Clarion river, its branches, and some other small streams; area, about 800 sq. m.; pop. in 1850, 3,581. The surface is broken by many hills and rough mountain peaks, the principal of which is Elk mountain, in the southern part. The county is occupied chiefly by thick forests, and lumber is the most important article of export. Bituminous coal is found in great abundance. The soil is better adapted to grazing than to the culture of grain; in 1850 it produced 10,776 bushels of Indian corn, 24,040 of oats, 26,656 tons of hay, and 31,755 lbs. of butter. There were 3 churches, 1 newspaper

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office, and 415 pupils attending public schools. The county was organized in 1843, and named from Elk mountain. Capital, Ridgeway.

ELK, a name properly applied to the alcine division of the deer of the snowy regions, to the genus *alces* (H. Smith). In this genus the muzzle is very broad, and covered with hair, except a small bare spot in front of the nostrils; the upper lip is 4 inches longer than the lower, and answers for prehensile purposes; the neck is thick and short, and the throat somewhat maned in both sexes; the hair is coarse, thick, and brittle; the hind legs have the tuft of hair rather above the middle of the metatarsus; the horns in the males are broad and palmated; the tail is short. The nose cavity in the skull is very large, reaching posteriorly to a line over the front of the molars; the long intermaxillaries do not reach to the very short nasals. The horns have no basal snag, the first branch being considerably above the crown. The young are not spotted, but colored like the adult. Elks live in the woods in the northern parts of both continents, but the American is by some considered a distinct species from the European. The true American elk, or moose (as it is universally called here), *alce Americanus* (Jardine), exceeds all other existing deer in size and strength, and unites to great speed remarkable powers of endurance; it is as large as a horse, standing 5 feet high at the shoulders, and measuring about 7 feet from nose to tail; the length of the latter is about a foot; the weight of the horns varies from 45 to 70 lbs., and that of the animal from 8 to 12 cwt. The moose is an awkward, clumsy, and disproportioned creature, though from its size it possesses a certain majesty when seen amid the wild scenery of its favorite haunts. The head is too large in proportion to the body for any pretension to the symmetry usually seen in the deer family; the long, tumid, and movable upper lip gives to the face somewhat of an equine expression, and the heavy ears, more than a foot long, are decidedly asinine. Audubon says: "The head forcibly reminds us of that of an enormous jackass." The eyes are deep-seated and comparatively small; under the throat there is in both sexes a tuft of coarse bristly hair attached to a pendulous gland, which is most conspicuous in the young. The horns are found in the males only, and require 5 years for their full development; they begin to sprout in April, and complete their growth in July; the 1st year they are about an inch long; the 2d year, 4 or 5 inches, with perhaps a rudimentary point; the 3d year, about 9 inches, each dividing into a round fork; in the 4th year they become palmated, with a brow antler and 3 or 4 points; and the 5th year they have 2 crown antlers and 4 or 5 points; after this one or two points are added annually, up to as many as 23, with an expanse sometimes of nearly 6 feet to the outside of the tips, with the palm a foot wide within the points, and a circumference above the burr of 9 inches. The horns diminish in size after the animal has passed the period of greatest vigor; in old and vigorous animals they are shed in December, but young animals sometimes carry them until March. The 1st inner branch begins about 9 inches from the base; the palms are often unlike on the right and left sides, and are channelled irregularly on both surfaces; their color is brownish yellow, with the ends yellowish white. The incisor teeth, 6 in the lower jaw only, are gouge-like and very white; the eyes are black; the nose, forehead, and upper lip yellowish fawn; the sides of the head yellowish brown; the general color above varies from blackish to ashy gray; below lighter, with a yellowish white tinge. In winter the color is darker, and in advanced age so dark as to merit the name given to it by H. Smith, "the American black elk;" the grayish are said to be the largest, reaching a height of 7 or 8 feet. In summer the hair is short and soft, in winter longer and very coarse, with a fine short wool next the skin. Moose are not uncommon in the northern parts of Maine, and in Canada, Nova Scotia, and Labrador, especially in winter. In summer they frequent lakes and rivers to free themselves from insect pests, and feed upon water plants and the tender branches of overhanging trees. In the winter they retire to the elevated ridges abundantly provided with maple and other hard-wood trees, on the twigs and bark of which they feed. By the elongated upper lip they pull down the branches, which they hold with their fore legs until they are stripped of the twigs; the bark they peel off by including it between the hard pad on the roof of the mouth and the lower incisors. In winter they tread down the snow, forming what are called "yards," in which are generally found a male, female, and 2 fawns; as the trees are stripped they tread down fresh snow, and they are fond of going always in the same tracks. They prefer the twigs of the maple, willow, buttonwood, birch, and aspen, and grasses; in captivity they will eat the food of domestic cattle. Though their flesh is coarse, it is esteemed by hunters; the nose or muffle is a special favorite, being rich, gelatinous, and juicy, when cooked like calf's head; the steaks are juicy, often tender, but seldom fat; the flesh of yearlings is always preferred; the tongue is much relished, as are the fatty appendages to the large intestines, by the keen appetites of the hunters, who also consider the marrow warm from the shank bones an excellent substitute for butter on their bread. The moose trots, runs, and jumps with great speed, passing through seemingly impenetrable thickets and over broken ground without apparent effort; it swims well, with only the head and part of the neck above water; it is never seen like the reindeer on the ice, except from absolute necessity; when walking on untrodden snow its feet generally sink into it to the ground. Its sense of smell is very acute, and enables it to detect an enemy at a great distance; the breaking of the smallest twig is sufficient to startle it from its hiding place. The

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pairing season begins in September; during October the males become furious, fighting each other whenever they meet; they run noisily through the woods, and swim lakes and rivers in pursuit of the female; at this time it is dangerous for the hunter to approach, as they do not hesitate to attack him. The young are born in May, the first time one, and 2 annually afterward; the females are also very fierce in defence of their calves. The males are called bulls and the females cows. The proper times for hunting the moose are in March and September; in the latter month the animals are in their prime, and in the former they are most easily taken on account of the sharp crust impeding their progress through the snow. In hunting them in March, a few small curs are useful in worrying the animal and delaying him until the hunter comes up; it is useless to pursue them through soft snow, which offers no impediment unless it be deep, when the hunter can easily overtake them on snow-shoes. Many are shot from canoes on moonlight nights in September; the hunter imitates the call of the male, which, angry at the supposed intrusion of a rival, rushes to the water's edge to fight him, and meets instead the fatal bullet of his concealed foe. Slip-nooses attached to strong saplings, bent down in the moose paths to the water, will occasionally entrap a victim. The most exciting and most successful way is to start them from their yards, and pursue them over the snow. When wounded and brought to bay, they defend themselves fiercely, striking with their fore feet and horns; they will frequently turn upon the hunter when not wounded, and force him to fly for his life. Moose have been domesticated, and taught to draw carts and sledges, but during the rutting season they become perfectly intractable; if necessary, they might perhaps be made as useful to semi-civilized man as the reindeer. Their geographical distribution is extensive; they have been found at the mouths of the Mackenzie and Coppermine rivers, on the eastern slope of the Rocky mountains at the sources of Elk river, and in Oregon; on the eastern coast they are found from Labrador to northern New England and New York, their southern limit seeming to be 43° 30′. As in all other deer of cold and mountainous regions, there is considerable diversity in the size of the body and the horns of the moose, according to the abundance of food in the places inhabited by them.—The European elk (*A. malchis*, Ogilby) was once found between the 53d and 65th degrees of latitude, in Prussia, Poland, Sweden, Norway, and Russia, but is rarely seen at present except in the most northern of these countries; in Asiatic Siberia it is also found. The appearance is the same as that of the moose; from its long legs and overhanging lips the old authors thought that it grazed walking backward. From the great height of the shoulders above the crupper its gait is awkward and shuffling, and when running fast the hind limbs are very wide apart; its joints crack at every step, with a sound which may be heard at a considerable distance; a part of the sound is said to be made by the hoofs striking against each other. According to Hamilton Smith, the Teutonic name *elend* (miserable) was applied to this animal from its supposed frequent attacks of epilepsy, while its falls are really attributable to its tripping itself up by treading on its fore heels, the elevated position of the nose, with the horns laid horizontally on the back, preventing it from seeing the ground distinctly before it. The European elk seems to attain a size equal to that of the moose, measuring 6 feet high at the shoulder. The period of life is said to be about 20 years. Pennant states that elks were once used to draw sledges in Sweden, and that they could travel over 200 miles a day; their hide makes excellent leather for belts and coverings for the feet. Though most authors have regarded the American and European elks as the same, Agassiz has described the former as distinct, with the specific name *lobatus*, from differences in the shape of the nose, the form and branching of the horns, and other points. Sir John Richardson (in the "Fossil Mammals" of the "Zoology of H. M. S. Herald") also considers the species distinct, calling the American *A. muswa;* he compares the skeletons carefully, and mentions, among other characters, that the breadth of the face at the most protuberant part of the maxillary bones is less in the American than in the European elk; if they be regarded as the same, the proper name would be *A. Americanus* (Jardine). The name of elk is applied in this country to the wapiti (*cervus Canadensis*, Briss.), which should be called the American stag; this name is also given by the British sportsmen in India to some of the rusa or samboo deer; so that it is necessary to consider the country of the animal before deciding on the meaning of the word "elk."—There are many fossil species called elks, as the fossil or Irish elk (*C. giganteus*, Cuv.), found in the diluvial strata of Europe, and especially in the peat bogs of Ireland; this species was of great size, with an enormous development of horns, which, resembling those of the elk in their broad palmations, differed in the size and low situation of the basal antlers; in other parts of the skeleton it resembled most the stags. Another species, found in the peat bogs and upper tertiary of France and Germany, seems to have been a gigantic fallow deer. The fossil elk described by H. de Meyer, from the diluvium of Europe, differed from the living animal in the form of its forehead. A fossil elk (*C. Americanus*), allied to the wapiti, has been found in the United States, with the bones of the mastodon. The fossil *sivatherium*, described by Cautley and Falconer, from the Sewalik hills of the lower Himalaya range, seems in many respects to have resembled the moose; the form of the head and its size lead to the belief that it was elephant-like in the cellular prominences of its posterior portion; the face was short, and the nasal bones were raised into an arch over the external nostrils, indicating the probable

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existence of a trunk; we see the upper lip of the moose elongated also into a kind of prehensile proboscis; the head was also armed with 2 spreading horns, arising above and between the orbits; the molar teeth are entirely like those of ruminants; the anterior extremities (of which casts exist in the cabinet of the Boston society of natural history) indicate an animal of the size of a large elephant. This animal was undoubtedly a ruminant, with the pachyderm characters of a heavy form, short neck, and probably a proboscis; in like manner the ruminant moose departs from the deer family, and approaches the pachyderms (especially the *equidæ*) in its movable elongated snout, long ears, and general shape of the head and body.

ELKHART, a N. co. of Ind., bordering on Mich., and watered by St. Joseph's and Elkhart rivers, which unite within its borders; area, 467 sq. m.; pop. in 1850, 12,690. The surface is moderately uneven and diversified by prairies, oak openings, and several small lakes. The soil is fertile, and the productions in 1850 were 370,973 bushels of Indian corn, 174,716 of wheat, 104,940 of oats, and 8,287 tons of hay. There were 10 churches, 1 newspaper office, and 1,800 pupils attending public schools. The county has communication with Toledo, Chicago, and other places, by the Michigan southern and northern Indiana railroad, which passes through Goshen, the capital.—ELKHART, a post village and township of the above county, at the confluence of the St. Joseph's and Elkhart rivers, 156 m. N. from Indianapolis; pop. of the township in 1850, 1,035. It is the principal entrepot for the exports of the county, being situated on the line of the Michigan southern and northern Indiana railroad, and having communication by means of the river with Lake Michigan.

ELKHORN, the county seat of Walworth co., Wis., 12 m. N. from the Illinois state line, 4 m. W. from Lake Michigan, at the junction of the Racine and Mississippi and Wisconsin central railroads, and on the N. side of the Elkhorn prairie; pop. in 1858, above 1,500. In the same year it had a large and well finished court house, gaol, fire-proof county offices, 4 churches, large railroad buildings, and numerous stores and public houses.

ELL, a measure of length in various countries, used chiefly for cloths, linens, silks, and similar fabrics. The ell English is 45 inches, or 5 quarters; the ell Flemish 27 inches, or 3 quarters; the Scotch ell 37.06 inches.

ELLENBOROUGH, EDWARD LAW, baron, chief justice of the court of king's bench in England, born at Great Salkeld, Cumberland, Nov. 16, 1750, died in London, Dec. 13, 1818. He was educated at the Charterhouse school in London, and at St. Peter's college, Cambridge, and upon being called to the bar soon became eminent in his profession. His abilities as a lawyer and speaker were first displayed to advantage in the trial of Warren Hastings in 1788–'95, in which as leading counsel for the defendant he coped successfully with the eminent lawyers and statesmen opposed to him. In 1801 he was appointed attorney-general, and in 1802 he succeeded Lord Kenyon as chief justice of the king's bench, on which occasion he was elevated to the peerage as Baron Ellenborough. He retired from the bench a few weeks previous to his death.—EDWARD LAW, 1st earl of, an English statesman, son of the preceding, born Sept. 8, 1790. He was educated at Eton and at St. John's college, Cambridge, where he was graduated in 1809. Shortly afterward he entered parliament as a member for the now disfranchised borough of St. Michael's. Being a firm advocate of tory principles and a fluent speaker, upon the accession of the duke of Wellington to office, in 1828, he was appointed lord privy seal. During the administration of Sir Robert Peel, in 1834–'5, he became president of the board of control and first commissioner of Indian affairs, an office to which he was reappointed in Sept. 1841, upon the conservative triumph of that year. A few weeks afterward he was appointed to succeed Lord Auckland as governor-general of India. He arrived in Calcutta in Feb. 1842, and in April, 1844, he was recalled by the board of East India directors, contrary to the wishes of the cabinet. During his administration Scinde was annexed to the British dominions, and Gwalior reduced to subjection; but he was charged with excessive tenderness for the native troops, to the neglect of the employees in the civil service; with issuing proclamations which seemed to sanction idolatry; and with other questionable acts in his official capacity. Upon his return to England, however, he was created an earl, and in 1846 was appointed first lord of the admiralty, which office he held for a few months only. He remained out of office until the formation of the Derby cabinet in Feb. 1858, when he again became president of the board of control. In the succeeding May a despatch from Lord Ellenborough to Lord Canning, governor-general of India, strongly condemnatory of the proclamation of the latter confiscating the property of the natives of Onde, was made public, and excited such animadversion, that on the 11th of the month, after vindicating his course in a speech in the house of lords, he announced that rather than expose his colleagues to the censure of parliament he had resigned his office. The earl of Derby said that the resignation had been accepted with regret, but admitted that he considered the publication of the despatch premature and injudicious.

ELLERY, WILLIAM, one of the signers of the American declaration of independence, born in Newport, R. I., Dec. 22, 1727, died there, Feb. 15, 1820. He was graduated at Harvard college in 1747, and for a number of years after his marriage, which took place in 1750, was engaged in mercantile pursuits in Newport. He was also for some time naval officer of the colony of Rhode Island. In 1770, having for 2 years previous served as clerk of one of the courts, he commenced the practice of the law

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in Newport, in which he acquired eminence. The era of the revolution found him an ardent sympathizer with the colonies in their struggle with the mother country, and in May, 1776, he entered active political life by taking his seat in the memorable congress of that year as one of the delegates from Rhode Island. With his colleague, Stephen Hopkins, he set his name to the declaration of independence, the incidents connected with which event he was accustomed in his latter years to relate with great vivacity. He remained in congress until 1786, with the exception of the years 1780 and 1782, and on all occasions proved himself an active and useful member, and, notwithstanding a natural diffidence which it required strong efforts to overcome, a ready debater. As a member of the marine committee, and subsequently of the board of admiralty, he exercised considerable influence during his whole term of service, and the plan of fire ships to be fitted out at Newport has been attributed to him. In April, 1786, he was elected by congress commissioner of the continental loan office for the state of Rhode Island, and in 1790 was appointed by President Washington collector of Newport, an office which he held until his death, notwithstanding his frequent and frank avowals of political principles directly opposed to those of several administrations. He retained full possession of his mental faculties until the close of his long life, and was highly esteemed in his native place, not less for his social qualities and intellectual abilities than as a relic of the revolutionary era. An interesting biography of him by his grandson, Professor Edward T. Channing, is published in Sparks's "American Biography," vol. vi.

ELLESMERE, Francis Egerton, earl of, an English nobleman, born in London, Jan. 1, 1800, died there, Feb. 18, 1857. He was the 2d son of the 1st duke of Sutherland, and until the death of his father was known as Lord Francis Leveson-Gower. He was educated at Eton, and at Christchurch, Oxford, where he was graduated in 1821. In the succeeding year he entered parliament as a liberal conservative and a supporter of Canning, and became one of the earliest and most earnest advocates of free trade. He also supported the project for establishing the university of London, and on one occasion carried a motion through the house of commons for the endowment of the Roman Catholic clergy of Ireland. Between 1827 and 1830 he held various political offices; but in the latter year he retired from parliament. In 1833, upon the decease of his father, he came into possession of the immense estates of the late duke of Bridgewater, and of the picture gallery, valued at £150,000, which had been bequeathed to the duke of Sutherland, with reversion to his 2d son; on which occasion he assumed the name of Egerton in the place of his patronymic of Leveson-Gower. In 1835 he was elected member of parliament for South Lancashire, and continued to represent that constituency until 1846, when he was raised to the peerage as earl of Ellesmere, after which he retired from active political life. While a student at the university he printed a volume of poems for private circulation; but his first public appearance as an author was in 1824, when he published a translation of "Faust," with versions of popular lyrics from the works of Goethe, Schiller, and other German poets. He subsequently produced "Mediterranean Sketches" (London, 1843), containing the "Pilgrimage," a poem which records the author's tour in Palestine; "The two Sieges of Vienna by the Turks" (1847); "Guide to Northern Archæology" (1848); and a number of poems and plays printed for private circulation. The "Pilgrimage," after having been withheld from general circulation for many years, was republished in 1856 with a number of additional poems. In 1853 Lord Ellesmere visited the United States as British commissioner to the American exhibition of industry in New York, returning to England the same year.

ELLET, William Henry, an American chemist, born in New York about 1804, died in that city, Jan. 26, 1859. He was graduated at Columbia college in 1824. While pursuing his medical studies he gained a gold medal for a dissertation on the compounds of cyanogen. In 1832 he was elected professor of experimental chemistry in Columbia college, a position which he resigned in 1835 to become professor of chemistry, mineralogy, and geology in the South Carolina college. In 1848 he returned to New York, where he resided until his death. The legislature of South Carolina presented him with a service of silver plate for the discovery of a new and cheap method of preparing gun cotton. During the last 5 years of his life he was consulting chemist of the Manhattan gas company of New York.—Elizabeth Fries Lummis, wife of the preceding, an American authoress, born at Sodus Point, on Lake Ontario, N. Y. She is the daughter of Dr. William N. Lummis, a physician of some eminence, and at an early age was married to Professor Ellet, whom she accompanied to South Carolina, and with whom she returned to New York in 1848. In 1835 she produced a volume of poems, beside which she published while in South Carolina "Scenes in the Life of Joanna of Sicily" (12mo., 1840), "Characters of Schiller" (1841), and "Country Rambles," and contributed articles to several quarterly reviews on French and Italian poetry and literature. In 1848 she published, in 3 vols. 12mo., the "Women of the American Revolution," one of her most popular works, and the materials for which were derived from original sources. Subsequently appeared her "Evenings at Woodlawn," "Family Pictures from the Bible" (1849), "Domestic History of the American Revolution" (1850), "Watching Spirits" (1851), "Pioneer Women of the West" (1852), "Novellettes of the Musicians" (1852), and "Summer Rambles in the West" (1853). She also edited "The Practical Housekeeper." She is now engaged

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upon a dictionary of female painters and sculptors, in which sketches are given of the women artists of all ages and countries.

ELLICOTT, ANDREW, an American astronomer and civil engineer, born in Bucks co., Penn., Jan. 24, 1754, died at West Point, N. Y., Aug. 28, 1820. His father, having united with a brother in the purchase of a large tract of wild land on the Patapsco river in 1770, left Bucks co. in 1774, and became a founder of what is now the town of Ellicott's Mills in Maryland, where the younger days of Mr. Ellicott were devoted to the study of the sciences and practical mechanics. Though belonging to the society of Friends, Mr. Ellicott commanded a battalion of Maryland militia in the revolution. His scientific attainments early attracted public attention, and from the revolution to the day of his death he was employed in the fulfilment of trusts conferred by the general or state governments. He enjoyed the friendship and confidence of Washington and his successors during life, and maintained the most intimate relations with Franklin and Rittenhouse, of whom his papers contain many interesting memorials. At various times he was appointed commissioner for marking parts of the boundaries of Virginia, Pennsylvania, and New York. About 1785 he removed to Baltimore, and represented that city in the state legislature. In 1789 he was appointed by President Washington to survey the land lying between Pennsylvania and Lake Erie, and during that year he made the first accurate measurement of the Niagara river from lake to lake, with the height of the falls and the fall of the rapids. In 1790 he was employed by the government to survey and lay out the federal metropolis. In 1792 he was made surveyor-general of the United States, and in 1795 he superintended the construction of Fort Erie at Presque Isle (now Erie, Penn.), and was employed in laying out the towns of Erie, Warren, and Franklin. In 1796 he was appointed by President Washington commissioner on behalf of the United States under the treaty of San Lorenzo el Real, to determine the southern boundary separating the United States territory from the Spanish possessions. The results of this service, embracing a period of nearly 5 years, appear in his "Journal," published in 4to., with 6 maps (Philadelphia, 1803). Upon the completion of this service he was appointed by Gov. McKean of Pennsylvania secretary of the state land office, the duties of which he performed to the year 1808, and in 1812 he received the post of professor of mathematics at West Point. In 1817, by order of the government, he proceeded to Montreal to make astronomical observations for carrying into effect some of the articles of the treaty of Ghent. He continued to fill the professorship of mathematics and civil engineering to the time of his death. Mr. Ellicott was an active member and useful officer of the American philosophical society, and maintained correspondence with the learned societies of Europe; but with the exception of his "Journal," contributions to philosophical societies, and a few other writings, his works are yet in manuscript.—JOSEPH, brother of the preceding, born in Pennsylvania, died in Batavia, N. Y., in 1826. In 1790 he assisted his brother Andrew in laying out the city of Washington, and in 1791 was appointed to run the boundary line between Georgia and the Creek Indians; and for a long period, embracing the most active portion of his life, he was engaged in the service of the Holland land company. He was a good mathematician, a scientific surveyor, and an able financier, led a life of great usefulness and enterprise, and was identified with the great public improvements of the state of New York.

ELLICOTT'S MILLS, a post village and township of Howard and Baltimore cos., Md., on the Patapsco river, 10 m. from the city of Baltimore; pop. in 1850, 1,059. It was first settled in 1774 by the brothers Andrew and John Ellicott, whose large flouring mills here at one time held precedence in extent and perfection over all similar manufactories in the country. For many years the whole of Ellicott's Mills, and extended tracts of country on the river, above and below, were kept with studied exclusiveness within the family. In 1859 not one of the name is residing within the limits of the settlement. The water power is excellent, and numerous cotton and other factories are propelled by it. The Baltimore and Ohio railroad passes through the village. It is the seat of St. Charles's (R. C.) college.

ELLIOTSON, JOHN, an English physician and physiologist, born in London in the latter part of the last century. He received his medical education at the university of Edinburgh and at Cambridge, and subsequently attended the medical and surgical practice of St. Thomas's and Guy's hospitals in London, of the latter of which institutions he was in 1822 elected physician. Subsequently he became lecturer on the practice of medicine in St. Thomas's hospital, and in 1831 was appointed professor of the principles and practice of medicine and of clinical medicine in University college, London, in connection with which 3 years later he succeeded in establishing a hospital, when he resigned his professorship at St. Thomas's. As a lecturer he obtained great popularity, not less from his genial manner than from his thorough mastery of his subject. His use of prussic acid in certain complaints, and of other new remedies, however, met with much opposition; and in attempting to reform the old routine of the hospitals, he incurred the hostility of many of the profession. He was the founder and subsequently the president of the phrenological society, and the president of the royal medical and chirurgical society. In 1837 the attention of Dr. Elliotson was drawn to the phenomena of animal magnetism, and to the reputed removal or alleviation of difficult diseases through its agency. Having satisfied himself that much of what he had read and heard upon the subject was founded on fact, he commenced a series of experiments which were

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attended by eminent scientific men from all parts of the kingdom, including a number of the medical faculty, and the striking results obtained from which convinced him that animal magnetism or mesmerism afforded a certain remedy for several diseases previously believed to be incurable, and was also the most powerful agent for allaying the pain attending surgical operations. His efforts gained many converts to mesmerism from the educated classes, whose zeal in his behalf was equalled by the violence of the opposition which assailed him. The unwillingness of his medical colleagues and of the council of the university to allow the mesmeric cure to be applied to the hospital patients induced him, in December, 1838, to sever his connection with University college, an event which made a considerable stir in the scientific world, and since that time he has been an indefatigable advocate of the curative agency of animal magnetism. In 1849 he was instrumental in establishing a mesmeric hospital, in which many remarkable cures have been effected. A mesmeric journal, called the "Zoist," was also established by him. Dr. Elliotson's principal contributions to medical science are: "Lectures on Diseases of the Heart" (London, 1830), which were delivered before the royal college of physicians in 1829; a translation of Blumenbach's "Physiology" (1817–'56), the notes to which are more voluminous than the text; the "Principles and Practice of Medicine" (London, 1840), a valuable work, which has been translated into various European languages; "Surgical Operations in the Mesmeric State without Pain" (London, 1843), &c.

ELLIOTT, Charles, D.D., an American Methodist divine, born in Killybegs, Donegal, Ireland, May 16, 1792. In his youth he became a member of the Wesleyan Methodist society, soon after began a course of study preparatory for the ministry, and in his 24th year applied to the Dublin university for admission, but was refused because he could not conscientiously submit to the established test. Having obtained, however, with the aid of classical scholars, what was equivalent to a university course, he emigrated to America, and proceeded to Ohio, where he was received into the travelling connection of the Ohio conference in 1818. For the first 4 years he travelled over extensive circuits, and cheerfully submitted to all the privations of pioneer life. In 1822 he was appointed superintendent of the mission among the Wyandot Indians at Upper Sandusky, was subsequently for 5 years presiding elder of the Ohio district, and was then elected professor of languages in Madison college, Uniontown, Penn., where he remained 4 years. In 1831 he was stationed in Pittsburg, and was subsequently presiding elder of that district. While serving in this capacity he was chosen editor of the "Pittsburg Conference Journal," and was afterward transferred to the editorship of the "Western Christian Advocate," at Cincinnati, where he remained until 1848. He again entered the regular work of the clergy, but in the general conference of 1852 he was reëlected editor of the "Western Advocate," which office he filled for another term of 4 years, making in all about 15 years of editorial service. He has also written a "Treatise on Baptism" (1834); "Life of Bishop Roberts;" "Delineation of Roman Catholicism" (2 vols. 8vo., New York, 1851); and "History of the Great Secession from the Methodist Episcopal Church" (8vo., Cincinnati, 1855). Dr. Elliott is now president of the Iowa Wesleyan university, and is preparing a work on "Political Romanism."

ELLIOTT, Charles Wyllys, an American author, born in Guilford, Conn., May 27, 1817. He is the 5th generation in lineal descent from Eliot the "Indian Apostle." After some years spent in mercantile life in the city of New York, he in 1838–'9 studied horticulture and landscape gardening with A. J. Downing at Newburg, and from 1840 to 1848 practised those pursuits at Cincinnati. Since 1850 he has resided in New York. He was one of the founders and first trustees of the "Children's Aid Society" in 1853. In 1857 he was appointed one of the commissioners for laying out the central park in the city of New York. Mr. Elliott has published the following works: "Mysteries, or Glimpses of the Supernatural" (1 vol. 12mo., New York, 1852), an attempt to refute spiritualism; "St. Domingo, its Revolution and its Hero, Toussaint Louverture" (1 vol. 12mo., New York, 1855); "The New England History, from the Discovery of the Continent by the Northmen, A. D. 986, to 1776" (2 vols. 8vo., New York, 1857).

ELLIOTT, Charles Loring, an American painter, born in Scipio, N. Y., in 1812. His father, an architect by profession, removed to Syracuse in the childhood of his son, and placed him in the store of a country merchant. The occupation was altogether distasteful to young Elliott, who devoted all his leisure time to his favorite pursuits of drawing and painting, with the expectation of one day becoming a painter. His father, seeing that he was unfitted for a mercantile life, allowed him to study drawing and architecture, though chiefly with the view of making a practical architect of him. Elliott, soon tiring of this occupation, went to New York and became a pupil of Trumbull, and subsequently of Quidor, a painter of fancy pieces, with whom he remained long enough to acquire a knowledge of the technicalities of his art. His chief employment for some time was copying prints in oils, and he afterward attempted portraits, though with no great success. Some of his youthful productions, however, evinced talent, and some oil paintings by him representing scenes from Irving's and Paulding's works attracted considerable attention. After about a year's residence in New York he returned to the western part of the state, where he practised his profession, more particularly portrait painting, for about 10 years. Returning to New York at the end of that period, he established himself there as a portrait painter, and has since

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been a resident of that city or its immediate neighborhood. His works consist almost exclusively of portraits, many of which are of eminent American citizens, and are remarkable for the fidelity of the likeness and their vigorous coloring. Since 1846 Mr. Elliott has been a member of the national academy of design.

ELLIOTT, Ebenezer, an English poet, born at Masborough, near Rotherham, Yorkshire, March 17, 1781, died near Barnsley, Dec. 1, 1849. His father, who was employed in a foundery near Masborough, was a dissenter of what was called the Berean sect, an occasional preacher, and a forcible political speaker of the ultra radical type. Young Elliott received the education usually afforded to boys of his condition, but at school was noted for little else than dulness and laziness. He was unable to master the rudiments of grammar or arithmetic, and often gratified an instinctive love for nature and solitude by stolen rambles in the meadows and woodlands. His father, hearing of these vagabond habits, set him to work in the foundery. He was beginning to fall into dissipated habits when the perusal of a treatise on botany, which accident put into his hands, revived his love of nature, and he became an industrious collector of botanical specimens. He also procured access to a small library of the old divines and poets, and in his 17th year produced his first published poem, "The Vernal Walk," a crude imitation of Thomson. It was followed by "Night," "Wharncliffe," and others. The author's powers increased with each new work, and he had the good fortune to attract the notice of Southey, to whose kind offices he was accustomed to refer with affection and gratitude. He had meanwhile worked steadily at the foundery, which his father had purchased on credit, and having married set up in the iron business on his own account. At 30 years of age he became an earnest advocate of the laboring classes. The corn laws in particular struck him as unjust, and upon his subsequent failure in business he attributed his misfortunes to their influence. In 1821 he made another venture as an iron merchant in Sheffield, with a borrowed capital of £100, and was soon embarked in a lucrative business. He now commenced his well-known "Corn Law Rhymes," which were written with the sole purpose of procuring the repeal of the obnoxious laws. At first published in a local paper and afterward collected in a single volume, these poems brought Elliott into notice. The "Ranter," which succeeded, was a long poem in a similar vein. In 1829 appeared his "Village Patriarch," exceeding in length any of his previous productions, and the best of his larger pieces. In 1833 he commenced a complete edition of his works, which appeared during the next 2 years, and for the first time made generally known many of the author's poems not of an exclusively political character. Several other editions appeared in the course of his life, and to the last he continued to write verses, chiefly for the periodical press, and not unfrequently spoke in public in support of his peculiar views. The commercial panic of 1837 entailed serious pecuniary losses upon him, but by careful management he was enabled in 1841 to retire from business with a competency and settle at a villa near Barnsley, where he passed the last years of his life in pleasant seclusion. Since his death 2 volumes of his literary remains have appeared under the title of "More Prose and Verse by the Corn Law Rhymer."

ELLIOTT, Jesse Duncan, a commodore in the U. S. navy, born in Maryland in 1782, died in Philadelphia, Dec. 18, 1845. He entered the service as a midshipman in April, 1806, and was promoted to a lieutenancy in April, 1810. In 1812 he was attached to the command of Commodore Isaac Chauncey at Sackett's Harbor, and was sent by him to the upper lakes to purchase vessels, and make other preparations for the creation of a naval force in those waters. While at Black Rock, engaged in this service, 2 British brigs, the Detroit and Caledonia, anchored, Oct. 7, 1812, near the opposite shore under the guns of Fort Erie. Elliott conceived the idea of capturing them. Fortunately the first party of seamen intended for the lake service arrived from the seaboard on that very night, and Gen. Smythe, the commanding military officer on the frontier, not only promptly complied with the requisition for arms for this service, but furnished a detachment of 50 soldiers for the purpose. A boat expedition was organized under Elliott's command, and the vessels were boarded and carried with but slight loss a little after midnight, Oct. 8. The Detroit mounted 6 guns, with a crew of 56; the Caledonia mounted 2 guns, and had a smaller complement. About 40 American prisoners were found on board these vessels. The Caledonia was safely brought over to the American side, but the Detroit was compelled to drop down the river, passing the British batteries under a heavy fire, and anchoring within reach of their guns. In the end this vessel was burned by the Americans, most of her stores having first been removed. For this exploit Elliott was voted a sword by congress. In July, 1813, he was promoted to the rank of master commandant, and appointed to the Niagara, a brig of 20 guns, on Lake Erie. In Perry's memorable engagement with the British squadron, Sept. 10, 1813, Elliott was second in command, and a gold medal was voted him by congress for his conduct on the occasion. After the battle of Lake Erie, Elliott returned to Lake Ontario, where he was actively employed until Nov. 1813, when he was appointed to the command of the Ontario sloop of war, which had just been built at Baltimore. This vessel was one of the squadron of Commodore Decatur employed against Algiers in 1815, and assisted in the capture of an Algerine frigate off Cape de Gatt. In March, 1818, he was promoted to the rank of captain, and subsequently had the command of squadrons on the coast of Brazil, in the West Indies, and in the Mediterranean, and of the navy yards at Boston and Philadelphia. His conduct while

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in command of the Mediterranean squadron did not meet the approval of the executive, and resulted in his trial by court martial in June, 1840, and suspension from duty for 4 years. In Oct. 1843, the period of his suspension which then remained was remitted by the president. Commodore Elliott's name was much before the public for many years, as his conduct in the battle of Lake Erie unfortunately became the subject of a controversy which lasted until his death.

ELLIOTT, STEPHEN, an American naturalist, born in Beaufort, S. C., Nov. 11, 1771, died in Charleston, March 28, 1830. He was graduated at Yale college in 1791, and 2 years later was elected a member of the legislature of South Carolina, a position which he retained until the establishment of the "Bank of the State" in 1812, of which he was chosen the president. He retained this office till his death. His leisure hours were devoted to literary and scientific pursuits, and he cultivated the study of botany with enthusiasm. In 1813 he was instrumental in founding the literary and philosophical societies of South Carolina, of each of which he was the president. He lectured gratuitously on his favorite science, and was for some time chief editor of the "Southern Review," to which he contributed a number of articles. In 1825 he aided in establishing the medical college of the state, and was elected one of the faculty, and professor of natural history and botany. He is the author of the "Botany of South Carolina and Georgia" (2 vols. 8vo., Charleston, 1821–'24), in the preparation of which he was assisted by Dr. James McBride, and left a number of works in manuscript. His acquaintance with general literature was extensive, and he was thoroughly read in the scientific works of the modern French school. His collection in the several departments of natural history was at the time of his death one of the most extensive in the country. The degree of LL.D. was conferred upon him by Yale and Harvard colleges.—STEPHEN, D.D., son of the preceding, bishop of the Protestant Episcopal church for the diocese of Georgia, born at Beaufort, S. C., in 1806. He was graduated at Harvard college in 1824, and was ordained a deacon in 1835, and a priest in 1836, soon after which he became professor of sacred literature in the South Carolina college. In 1840 he was elected bishop of Georgia, and in Feb. 1841, was consecrated.

ELLIOTT, WILLIAM, an American author and politician, born in Beaufort, S. C., April 27, 1788. He was entered in Harvard college at the age of 18, but ill health compelled him to return home before the completion of his academical career. For many years he devoted himself to the management of his estates, and served with credit in both branches of the state legislature. During the nullification crisis in South Carolina in 1832 he held the office of senator in the state legislature, but resigned upon being instructed by his constituents to vote to nullify the tariff law. He has since participated less frequently in public affairs, his letters against secession signed "Agricola," and published in 1851, being among his latest expressions of opinion on political subjects. He has contributed largely to the periodical press of the South. His published works consist of an "Address before the St. Paul's Agricultural Society" (Charleston, 1850), and "Carolina Sports by Land and Water" (1856). He is also the author of "Fiesco," a tragedy printed for the author in 1850, and of a number of occasional poems of merit, few of which, however, have been published.

ELLIPSE, one of the conic sections, a figure bounded by a curve line produced by cutting through a cone with a plane, or by letting the shadow of a circle fall on a plane. The discussion of this curve began with Plato, 430–347 B. C., and was continued with great zeal for about 2 centuries. No important advance in the knowledge of the ellipse was then made for about 1700 years, when the research into its properties was renewed and still continues. The ellipticity of the planetary orbits is one of the immortal discoveries of Kepler. The knowledge of this curve is essential in the mathematical investigation of many physical problems. One of the most important properties of the curve line bounding an ellipse is that every point in this line is at such distances from 2 points in the figure called the foci, that the sum of the 2 distances is always equal to the longest diameter of the ellipse. An ellipse may therefore be drawn by driving 2 pins in a board, to mark the foci, putting a loose loop of inelastic thread over the pins, and then drawing the curve with a pencil placed inside the loop and stretched out as far as the loop will allow. A second important property of the curve is that lines from any point of it drawn to the foci make equal angles with the curve. Hence light emanating from one focus would be reflected by the curve to the other focus. If the other focus were at an immeasurable distance, the curve would be a parabola, and the light would proceed out in parallel lines; or light coming from an inverse distance would be reflected into the focus. Hence the parabola gives the proper form for a telescopic mirror. These are the most important of the simpler properties of the ellipse; the higher and equally important properties are scarcely capable of expression without the use of mathematical forms. When an ellipse, instead of being traced on a plane surface, is traced on the surface of a sphere, it is called a spherical ellipse.

ELLIS, a N. co. of Texas, drained by Trinity river, which forms its E. boundary; area, 1,000 sq. m.; pop. in 1858, 3,212, of whom 723 were slaves. The surface is occupied by prairies and tracts of hard timber. The prairies are very fertile, and produce maize and cotton. In 1850 there were raised here 28,744 bushels of Indian corn, 2,617 of potatoes, 17,220 lbs. of butter and cheese, 287 of rice, and 200 of tobacco. Value of real estate in 1858, $545,600. Capital, Waxahachie. Formed in 1849.

ELLIS, GEORGE EDWARD, an American clergyman, pastor of the Harvard church, Charles-

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town, Mass., born in Boston in 1815. He was graduated at Harvard college in 1833, studied theology at the Cambridge divinity school until 1836, and after a year's travel in Europe was ordained in 1840 as pastor of the church still under his charge, and previously under the charge of the Rev. James Walker, now president of Harvard university. He has been an industrious and successful writer, is the author of the lives of John Mason, Anne Hutchinson, and William Penn, in Sparks's "American Biography," and in 1857 published a very elaborate work, the "Half Century of the Unitarian Controversy." He edited for a time the "Christian Register," the religious newspaper of the Massachusetts Unitarians, and for some years, in connection with the Rev. George Putnam, D.D., he conducted the "Christian Examiner." He has contributed largely to various periodicals, including the "New York Review," the "North American," the "Christian Examiner," and the "Atlantic Monthly," most frequently upon topics of American history. In 1857 he was appointed professor of doctrinal theology in the Cambridge divinity school, and received the degree of D.D. from Harvard university. He is a prominent member of the Massachusetts historical society, and active in its antiquarian researches and collections. In his religious views he belongs to the more conservative class of Unitarians, and takes a decided stand against the new rationalism. He is a zealous friend of popular education, and has spoken and written much for common schools. His published sermons, addresses, pamphlets, &c., have been numerous.

ELLIS, George, an English author, born in 1745, died April 15, 1815. He commenced his literary career as a writer of political satires, and became favorably known as a contributor to the "Rolliad," and subsequently to the "Anti-Jacobin." The study of early English literature, however, occupied his leisure hours, and in 1780 he produced "Specimens of Ancient English Poetry," of which enlarged editions appeared in 1801 and 1811. A companion work, "Specimens of Ancient English Romances," appeared in 3 vols. 8vo. in 1805, and has since been republished in Bohn's "Antiquarian Library" (London, 1848).

ELLIS, Sir Henry, an English author and antiquary, born in London in 1777. He was educated at St. John's college, Oxford, and in 1805 became one of the assistant librarians of the British museum. A new and enlarged edition of Brand's "Popular Antiquities" was issued under his care in 1813, and was republished in a cheaper form in 1842. In 1816 he wrote a careful and elaborate introduction to the "Domesday Book," and in 1824 published a series of "Original Letters illustrative of English History," from autographs in the British museum (3 vols. 8vo.); a second series, in 4 vols., in 1827; and a third, in 4 vols., in 1846. Sir H. Ellis was from 1827 to 1856 head librarian of the British museum.

ELLIS, William, an English missionary and author, born in the latter part of the last century. In 1815 he became officially connected with the London missionary society, under whose auspices, in Jan. 1816, he sailed with his wife for Polynesia. He spent nearly 10 years in promoting the spiritual welfare of the natives of the South sea islands (at one of which, Tahiti, he erected the first printing press in Polynesia), and in 1824 returned to England on account of the illness of his wife, stopping for some time on the way in the United States, where he received much attention. For some years he was employed in the business of the London missionary society at home, and published "Narrative of a Tour through Owhyhee" (8vo., London, 1826); "Polynesian Researches" (2 vols. 8vo., 1829); "History of Madagascar," compiled from information received from missionaries and government documents (2 vols., 8vo., 1839); "History of the London Missionary Society" (8vo., 1844); "Village Lectures on Popery" (8vo., 1851), &c. In 1835 his wife died, and 2 years later he was married a second time to Miss Sarah Stickney, with whom he resided for many years in Hoddeston, Hertfordshire, where Mrs. Ellis conducted a school for girls. In 1853 Mr. Ellis proceeded to Madagascar on a mission of observation for the London missionary society, and after three visits to that island published an interesting and valuable work, under the title of "Three Visits to Madagascar, during 1853–'56, with Notices of the People, Natural History, &c." (London, 1859), of which 2 republications have appeared in the United States.—

Sarah Stickney, wife of the preceding, an English authoress, born in the beginning of the present century. Her parents belonged to the society of Friends, among whom she received her education. Her first literary production was a didactic work for the young, entitled the "Poetry of Life;" and since her marriage in 1837, she has written many volumes devoted to the moral and mental culture of her sex. The principal of these are: "Home, or the Iron Rule;" the well-known series, entitled the "Women of England" (1838), the "Daughters of England" (1842) the "Wives of England" (1843), and the "Mothers of England" (1843); "Look to the End" (2 vols. 8vo., 1845); "Hearts and Homes" (3 vols. 8vo., 1848–'9), &c. She is now (1859) engaged upon the preparation of a new work to be called "Mothers of Great Men." Her publications, numbering between 20 and 30, have exercised a beneficial influence in the domestic life of Great Britain and the United States.

ELLISTON, Robert William, an English actor, born in London, April 7, 1774, died there, July 7, 1831. He was educated at St. Paul's school, but at the age of 17 ran away and joined a theatrical company at Bath, where he made his first appearance on the stage in April, 1791. Five years later he made his début in London, at the Haymarket theatre, and in 1803 became principal actor and acting manager of that house. In the succeeding year he was

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engaged at Drury Lane, but after the burning of the theatre, having quarrelled with Thomas Sheridan, he left the company, and opened the Surrey theatre. On the rebuilding of Drury Lane he was again engaged as a leading actor, and recited the address written by Lord Byron for the opening night. In 1819 he became the lessee of Drury Lane, but in 1826 retired a bankrupt. Subsequently he was again manager of the Surrey theatre, and continued occasionally to perform his principal characters until the close of his life. Elliston was called the first comedian of his time. His chief merit perhaps was the facility with which he adapted himself to every variety of characters, from the broadly humorous to the tragic. He possessed an inordinate self-esteem, and many anecdotes are told of his whimsical eccentricities.

ELLORA, Elora, or Elouro, a decayed town of Hindostan, in Hyderabad, 13 miles N. W. from Aurungabad, and celebrated for its cave temples, excavated from the inner slope of a horse-shoe-shaped hill, about a mile from the town. These caverns are sculptured over an extent 1¼ mile in length, and may be regarded as a Hindoo pantheon, since every divinity of India has there a shrine. Most of the caves are not less than 100 feet in depth; 20 of them are consecrated to Siva, and 2 to the Trimurti, or Brahminic trinity. They are all adorned with colossal statues and innumerable sculptures and bass-reliefs. The greatest and most remarkable of these monuments is the *Kailasa*, or paradise, dedicated to Siva, and designed to represent the court of that divinity where he receives those of his worshippers who, having escaped metempsychosis, come after death to enjoy eternal happiness. This does not, like the others, extend subterraneously, but rises to a lofty height in a vast excavation. It is composed of a portico, a chapel, and a grand pagoda. The portico is sustained by pillars and flanked by curious sculptures. Two obelisks, 60 feet in height, and 2 gigantic elephants, surround and support the chapel, which is likewise adorned on every side by statuary. The pagoda rises from the centre of the whole structure to the height of 95 feet, and is surrounded externally by mythological designs and sculptures representing lions, tigers, elephants, and fantastic animals of all sorts. Within are 42 colossal figures of Hindoo divinities, each one the centre of a group; and beyond this main temple may be seen others of smaller size and similar decorations. These gigantic works are of unknown antiquity, and seem to have been executed by Buddhists as well as by Brahmins. The village of Ellora is small, and is resorted to by numerous pilgrims.

ELLSWORTH, a port of entry, and capital of Hancock co., Maine, on both sides of the Union river, a navigable stream, which empties into Frenchman's bay about 4 miles below this point, the opposite banks being connected by 4 bridges; pop. in 1850, 4,009; in 1854, about 5,000. Ellsworth is one of the most flourishing towns in the state, and a place of commercial importance. It is extensively engaged in the lumber trade, exporting every year about 50,000,000 feet of lumber. It contains the county buildings, and in 1859 had 2 churches, a high school, a newspaper office, 2 hotels, 2 banks, 9 saw mills, 2 grist mills, 9 lath machines, 1 shingle factory, 1 tannery, 1 machine shop, 1 carding mill, 1 pottery, 8 brick yards, and 13 ship-building yards. Capital invested in manufactures, about $2,000,000. The tonnage of the district (Frenchman's bay), June 30, 1858, was 27,632 enrolled and licensed, and 6,733 registered.

ELLSWORTH, Oliver, LL.D., 2d chief justice of the United States, born in Windsor, Conn., April 29, 1745, died Nov. 26, 1807. He was graduated at the college of New Jersey in 1766, and soon after commenced the practice of law. In 1777 he was chosen a delegate to the continental congress, and in 1780 was elected a member of the council of Connecticut, in which body he continued till 1784, when he was appointed a judge of the superior court. In 1787 he was elected to the convention which framed the federal constitution, and was afterward a member of the state convention, where he earnestly advocated the ratification of that important instrument, which his exertions had essentially aided in producing. In 1789 he was chosen a senator of the United States, which station he filled till 1796, when he was nominated by Washington chief justice of the supreme court of the United States, over which he presided with great distinction, his opinions being marked by sound legal and ethical principles, in clear and felicitous language. In 1799 he was appointed, by the elder Adams, envoy extraordinary to Paris, and with his associates, Davie and Murray, he successfully negotiated a treaty with the French. This accomplished, and his health beginning to fail, he visited England for the benefit of its mineral waters; but his infirmities increasing, he resigned his office of chief justice in 1800. Returning to Connecticut, he was again elected a member of the council; and in 1807 he was appointed chief justice of the state, which office he declined, under the impression that he could not long survive under the distressing malady which soon closed his days. He was eminently distinguished both for public and private virtues, and his reputation was so irreproachable that in the hottest partisan conflicts his character was never assailed.

ELLWOOD, Thomas, a minister of the Friends, a friend of Milton, born in Crowell, Oxfordshire, in 1639, died in 1713. At an early age he attached himself to the society of Friends, thereby giving great offence to his father, but neither blows nor persuasions could induce the son to renounce his new sentiments, to take off his hat before his parents, or to address them with other pronouns than "thou" and "thee." He was, like most of the other ministers of his time, the author of numerous controversial works. The most considerable of these is his "Sacred

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History of the Old and New Testaments." He also wrote a poem entitled *Davideis*, of which King David was the hero. But he is chiefly known from the circumstance that he was one of those selected by the poet Milton to read to him after the loss of his sight. During the raging of the plague in London in 1665 he obtained a retreat for Milton at Chalfont, and there he is said first to have suggested the idea of the "Paradise Regained."

ELM (*ulmus*, Linn.), a tree of the natural order *ulmaceæ*, which embraces some of the noblest and most important species in the United States. All the plants belonging to this family have simple, rough, serrate, unequal-sided leaves; flowers small, in bunches on the side of the twigs; the fruit either a winged samara or a drupe. Three genera of *ulmaceæ* are found within the limits of the United States. The most conspicuous of these is *ulmus*, of which we especially notice the white or American elm (*U. Americana*, Linn.). No tree can surpass this in the beauty of its proportions. In old trees especially, from the wide-spreading, buttress-like roots to the wider spreading branches, the curvature is beautiful and graceful in the extreme. Situation seems, however, to give variety to the outline. In wet pastures or similar places, a tall, slender trunk, crowned with a few pendent limbs, and clothed nearly from the ground with a feathery investment of small branches, which are scarcely more than leafy branches of twigs, is a pleasing object seldom overlooked or casually regarded. The rapidity of the growth of the white elm adapts it to artificial planting where shade is soon needed. Hardy to an unusual degree, it soon becomes a favorite with the tree planter, ranging in its distribution from Saskatchewan on Hudson's bay to Georgia. The wood of the white elm is used for making hubs of wheels, and is preferred for that purpose to any other native wood. Yokes are made of it, and near the coast ship blocks are constructed of its timber. The white elm grows readily from seed, which should be sown as soon as ripe, and may be gathered in almost any desirable quantity from the ground under the trees, falling as early as June. The seeds should be very slightly covered, and the young plants will rise in a few weeks, when they should be watched and weeded, and in succeeding seasons should be thinned out and transplanted to insure well-formed trees. In transplanting full-grown and vigorous young specimens found where they have appeared spontaneously, it is necessary to secure as many of the fibrous roots as possible, and have them spread out in large and ample holes, well prepared with good soil; care must be taken not to have them too deeply covered. The slippery elm (*U. fulva*, Mx.) is a much smaller tree, with larger and more beautiful foliage, and soft, downy, rusty-haired buds, whence the name sometimes applied of red elm. Its flowers are in lateral clusters; the samara is larger and with a broader border. The inner bark contains a great quantity of mucilage, of much value in medicine. Michaux considers its wood as superior to that of the white elm. The tree can be readily grafted upon the white elm, and if only for ornament it is well worthy of cultivation. The corky white elm (*U. racemosa*, Thomas) has its branches often beset with corky ridges; its leaves are similar to those of the white elm; its flowers are in racemes; its wood is tougher and finer grained. The wahoo or winged elm (*U. alata*, Mx.) is a small tree, seldom exceeding 30 feet in height, has a fine-grained, valuable wood, and is to be found in Virginia and southward. The English elm (*U. campestris*, Linn.) was early introduced into this country, and is a stately tree, contrasting finely with the American. Its branches, unlike that, tend upward, or else spread more horizontally, and its foliage is of a darker green and more pleasing to the eye. The wych elm (*U. montana*, Bauhin) has been partially introduced; it is much cultivated in Scotland, and goes by the name of the Scotch elm. It resembles the slippery elm. The nettle tree has a trunk from 20 to 60 feet high. Its leaves are obliquely lanceolate, acuminate, sharply serrate; its fruit is a sort of plum or drupe of a yellowish green color. It has several varieties, considered by some botanists as distinct species, but probably nothing more than forms of *celtis occidentalis* (Linn.). They grow on the poorest and most arid soils, but flourish best in a rich and moist ground. Michaux says that the wood of the hackberry (*C. crassifolia*, Mx.) is fine-grained and compact, but not heavy. The planer tree (*planera aquatica*, Gmelin) has small leaves like those of elms; the flowers are borne in small axillary clusters; the fruit is nut-like. According to Michaux, it grows on wet banks in Kentucky and southward. He considers its wood as hard, strong, and proper for various purposes. It has not, however, been put to any use in this country, and is so little esteemed as to have received no popular name. It is worthy of attempts at cultivation northward, and can be readily propagated by grafting it upon the elm.

ELMACINUS, or EL MACIN, GEORGE, known in the East by the name of Ibn Amid, an Arabian historian, born in Egypt in 1223, died in Damascus in 1273. He was a Christian, and held at the court of the sultans of Cairo the office of *ketib* or secretary. He wrote a history of the East, especially of the Arabs, from the creation of the world to his time, a portion of which was published both in Arabic and Latin by Erpenius, at Leyden, in 1625; the Latin version was soon reprinted, and was followed by a French translation. A complete edition in Arabic remains in use among the Christians of the Levant.

ELMES, JAMES, an English architect, born in London, Oct. 15, 1782. He practised his profession in the early part of his life, and gained the silver medal in architecture at the royal academy in 1804. He was for some time surveyor and civil engineer of the port of London,

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but loss of sight, which, however, he afterward partially recovered, caused him to relinquish the office in 1828. He has published "Memoirs of the Life and Works of Sir Christopher Wren" (4to., London, 1823); "Lectures on Architecture" (8vo., 1823); "General and Bibliographical Dictionary of the Fine Arts" (8vo., 1826); "On the Law of Dilapidations" (royal 8vo., 1826); "Treatise on Architectural Jurisprudence" (8vo., 1827). Among his most recent productions is a work on Thomas Clarkson (London, 1854).

ELMINA, or St. George del Mina, a town in Ashantee, W. Africa, capital of the Dutch settlements on the Gold Coast, on a small bay near the mouth of the river Beira, 5 or 6 m. W. of Cape Coast Castle. It is a large and dirty town, containing a considerable native population of traders, fishermen, servants, and artificers, the last being very numerous and mostly held as slaves. There are several country residences and farms belonging to the governor and merchants, back of which is an undulating country covered with dense forests. The fortress, situated on a low, rocky peninsula, is very strong, and was the first European establishment on this coast. It was built by the Portuguese in 1481, captured by the Dutch in 1637, and finally ceded by Portugal to the latter nation with other possessions in 1641.

ELMIRA, a post village and township and the capital of Chemung co., N. Y.; pop. in 1855, 8,486. It is situated on Chemung river, near the mouth of Newtown creek, and has easy communication both by land and by water with all the principal cities of the northern and middle states. The New York and Erie railroad crosses the river at this point; the Williamsburg and Elmira railroad connects with other roads to Philadelphia, and the Elmira, Canandaigua, and Niagara Falls railroad opens a communication to Canada. It is also on the line of the Chemung and the Junction canals, the former uniting it with Seneca lake and the latter with the central parts of Pennsylvania. It presents every indication of prosperity, and has increased more rapidly than any other place on the New York and Erie railroad. It is well laid out, and contained in 1859 the county buildings; 9 churches, viz.: 2 Baptist, 1 Congregational, 1 Episcopal, 3 Methodist, 1 Presbyterian, and 1 Roman Catholic; 1 daily and 2 weekly newspaper offices, numerous good schools and academies, 5 grist mills, 10 saw and 2 planing mills, 1 manufactory of edge tools, 2 of soap and candles, 4 of coaches and wagons, 1 of woollen goods, 1 car factory and repair shop, 3 breweries, 4 furnaces, 3 machine shops, 4 tanneries, gas works, &c. Elmira is the seat of a female college capable of accommodating 300 pupils.

ELMORE, Franklin Harper, an American financier and politician, born in Laurens district, S. C., in 1799, died in Washington, D. C., May 29, 1850. He was graduated at South Carolina college in 1819, subsequently studied law, and in 1821 was admitted to the bar. In 1822 he was elected the solicitor, or public prosecuting officer, of the southern circuit, an office which he retained by successive reëlections until 1836, when he was chosen a representative to fill a vacancy in the 24th congress. He subsequently served throughout the 25th congress, and in 1839 was made president of the bank of the state of South Carolina, which position he held with credit until elected in 1850 to fill the vacancy in the U. S. senate occasioned by the death of Mr. Calhoun. He died immediately after entering upon the duties of his new office. In 1838 he was selected by the South Carolina delegation in congress as one of a committee to obtain authentic information respecting the anti-slavery movement. He addressed, Feb. 16, 1838, a letter to James G. Birney, corresponding secretary of the American anti-slavery society, enclosing a series of interrogatories as to the number of anti-slavery societies and members in the United States, their objects, expectations, means, and modes of operation. Mr. Birney replied at great length in a letter, which, with the other letters on both sides, was printed, and went through many editions under the title of "The Elmore Correspondence."

ELMSLEY, Peter, an English scholar, born in 1773, died March 8, 1825. He was educated at Westminster school, and at Merton college, Oxford, and was graduated master of arts in 1797. He officiated for a time to a small chapelry in Little Horkesley; but becoming master of a fortune by the death of an uncle, he devoted himself from that time to literary studies, and particularly to Greek literature. He lived for a while in Edinburgh, where he was intimately associated with the founders of the "Edinburgh Review," and contributed to that periodical several articles, among which were reviews of Heyne's "Homer," Schweighäuser's "Athenæus," Blomfield's "Prometheus," and Porson's "Hecuba." In 1816 he made a voyage to Italy in search for manuscripts, and passed the winter of 1818 in researches in the Laurentian library at Florence. The next year he was appointed to assist Sir Humphry Davy in the unavailing task of trying to decipher some of the papyri found at Herculaneum. After his return to England he published editions of several of the Greek tragedies.

ELOCUTION. See Oratory, and Voice.

ELOHIM, one of the Hebrew names of the Deity, the plural of *Eloah*. The name is also applied to angels, princes, judges, great men, and even to false gods.

ELPHINSTON, James, a Scotch grammarian, born in Edinburgh in 1721, died in Hammersmith, Oct. 8, 1809. He studied at the university of Edinburgh, became tutor to Lord Blantyre, superintended an edition of the "Rambler" in his native town, and in 1751 opened a school at Kensington. He was a zealous advocate of a change in English orthography, and published several works on the subject which exposed him to great ridicule. A translation of Martial (4to., 1782) was no better received.

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His principal works are: "French and English Languages" (2 vols. 12mo., 1756); "Education, a Poem" (1763); "English Language" (2 vols. 12mo., 1765); "Propriety ascertained in her Picture" (1786); *Poetæ Sententiosi, Latini*, &c. (1794); "Fifty Years' Correspondence, Inglish, French, and Lattin, in Proze and Verse, between Geniusses ov boath Sexes, and James Elphinstou" (8 vols. 12mo., 1794).

ELPHINSTONE, George. See Keith.

ELPHINSTONE, Mountstuart, 4th son of John, 11th Baron Elphinstone, an English statesman and historian, born about 1780. He entered the service of the East India company at an early age, was made assistant to the judge of Benares, rose rapidly to the post of resident at Poonah, and in 1809 was sent as ambassador extraordinary to the Afghan court at Cabool, where he succeeded in concluding a treaty against the French. The overthrow of the Afghan monarch in the same year rendered the compact inoperative, but, as the fruit of this mission, Mr. Elphinstone published his valuable "Account of the Kingdom of Cabul and its Dependencies in Persia, Tartary, and India," (4to., London, 1815), which has been twice reprinted. His conduct at Poonah during the troubles with the peishwa in 1817 was highly praised. He introduced many reforms in his district, and in Oct. 1818, was named governor of Bombay, on assuming which station he addressed to the Calcutta government a "Report on the Territories conquered from the Peishwa." His liberal policy, care of education, and study of the welfare of the natives, are commended by Bishop Heber in his "Indian Journal." Mr. Elphinstone retired from the Indian service in 1826, and on his departure for England the citizens of Bombay presented him with a service of plate, and founded in his honor the institution in Bombay which bears his name. In 1841 he produced his "History of India; the Hindoo and Mahometan Periods" (2 vols. 8vo.), a third edition of which appeared in 1848.

ELPHINSTONE, William, a Scotch prelate and statesman, born in Glasgow in 1437, died in Edinburgh, Oct. 25, 1514. He was educated at the university of Glasgow, received the degree of M.A., applied himself to theological studies, and was for 4 years rector of Kirkmichael, in Glasgow. Subsequently, while studying in Paris, he attracted the attention of the university by the extent and variety of his learning, and was appointed to the professorship of civil and canon law, first at Paris, and afterward at Orleans. After residing 9 years in France, he returned to Scotland, was made rector of the university at Glasgow and official or commissary of 2 dioceses, and at the same time was called to a seat in parliament and in the privy council. He settled a misunderstanding between James III. of Scotland and Louis XI. of France, and prevented a war. He was made bishop of Ross about 1480, and was successful in a second diplomatic mission in arranging a truce between Scotland and England, after which he was made lord high chancellor of Scotland. He was called to take part at the coronation of James IV. in 1488, and was immediately after sent as an ambassador to the emperor Maximilian to negotiate a marriage between the king of Scotland and the emperor's daughter; and on his way he concluded a treaty of alliance between Scotland and the states of Holland. At his suggestion the pope granted, in 1494, authority for the foundation of King's college in Old Aberdeen, which was erected in 1506. He wrote the lives of the Scottish saints, a work which has not reached our times, and a history of Scotland, which is still preserved in the Bodleian library at Oxford. After the defeat and death of James IV. at Flodden he was never seen to smile, and his death has been attributed to grief at that disaster.

ELSINORE, or Elsineur (Dan. *Helsingör*), a maritime town of Denmark, in the bailiwick of Frederiksborg, island of Seeland, 23½ m. N. E. from Copenhagen; lat. 56° 2′ 11″ N., long. 12° 36′ 49″ E.; pop. about 8,000. The town is built on the narrowest part of the sound, here but 3½ m. in width, opposite the Swedish town of Helsingborg. It commands the principal passage between the Cattegat and the Baltic, and is the spot where the sound dues (abolished in 1857) were formerly paid by all foreign vessels, except those of Sweden, navigating that channel. The town is substantially but irregularly built on ground rising gradually from the shore, with one main street crossed by others at right angles, and contains 2 churches, a town hall, a high school, an infirmary, a hospital, a theatre, and a cemetery beautifully laid out. The harbor is little more than the shelter afforded by a wooden pier, but the roadstead is excellent and is generally crowded with vessels. Adjacent to it, on the N. E., on a tongue of land running out into the sea, is the castle of Kronborg (Crown castle), built by Frederic II. about 1580. Modern fortifications have since added to its strength. It is now chiefly used as a prison. Caroline Matilda, queen of Christian VII., was imprisoned here until the interference of her brother, George III. of England. Under the castle are casemates capable of holding 1,000 men. According to a popular tradition, Holger Danske, the legendary hero of Denmark, resides in one of the subterranean vaults. In the courtyard of the castle is the lighthouse, showing a fixed light 113 feet above the sea level. A short distance N. W. of the town is the palace of Marienlyst (Mary's delight), once a royal residence, but now in private occupation. Near by is shown a pile of rocks, erroneously called the tomb of Hamlet, of whose story, as told by Shakespeare, Elsinore is the scene. Elsinore enjoys a good foreign trade. Most of the maritime nations have consuls, and several British mercantile houses have agencies here. Local industry is mostly engaged in the refining of sugar and brandy, printing cottons, fishing, &c. As the principal communication be-

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tween Sweden and the continent passes through this port, facilities for travel are abundant. Steam communication exists with Copenhagen and Helsingborg. An extensive manufactory of arms is in operation at Hammerwolle, in the suburbs. Elsinore was erected into a city in 1425; was taken and burned by the forces of Lübeck in 1522, and again in 1535 by Christian II. It was enlarged by the Dutch colonists in 1576. The castle was taken, Sept. 6, 1658, by the Swedes, under the orders of Gen. Wrangel, but was restored to the Danes in 1660. It failed to prevent the passage of the British fleet under Sir Hyde Parker, with Nelson as his second in command, in 1802.

ELSSLER, Fanny and Therese, two sisters celebrated as dancers, born in Vienna, Therese in 1808, Fanny in 1811. Fanny, the more famous, was instructed in the juvenile ballet corps of the Viennese theatre, and at the age of 6 made her appearance on the stage. Subsequently she received instructions from Auner, and a marked influence upon her general æsthetic culture was exercised by Baron Friedrich von Gentz. The two sisters, who were inseparable, gave performances at Naples for some time, and in 1830 made their first appearance at Berlin. Here the public had been in some measure prepared for Fanny's talent by the account given of her by Gentz to his friend Rahel Varnhagen von Ense, but her poetical conceptions of her art, and graceful presence, far surpassed all expectations. Henceforward her career assumed the character of a series of triumphal ovations. Vienna, which had been so slow to appreciate her, soon joined the general chorus of enthusiasm. While engaged at Berlin she made occasional excursions to London and other cities, and in 1834 she reached France. The sisters made their first appearance before a Parisian audience, Sept. 19, in *La tempête*, a ballet adapted from Shakespeare's "Tempest," by Adolphe Nourrit. Fanny was received with much applause, and considered entitled to the same rank with Taglioni, then at the head of her profession in Paris. She, however, found an occasion to eclipse her celebrated rival in the Spanish cachucha, a dance which she introduced for the first time in the ballet of *Le diable boiteux*. This was received with prodigious applause. The noted Dr. Véron offered her his hand; Jules Janin was in ecstasy; a romantic young Pole glorified her in *Lettres à une artiste* published by him at Brussels; Paris proclaimed her inimitable. In 1841 the sisters visited the United States, where they met with brilliant success, and afterward reaped another harvest of gold and glory in Russia. In 1851, after giving a few farewell performances at Vienna, Fanny retired from the stage with an immense fortune, and now resides at a villa near Hamburg. Her sister, who retired at the same time, contracted, April 25, 1851, a morganatic marriage with Prince Adalbert, of Prussia, and was ennobled under the title of Frau von Barnem.

ELTON, a salt lake in the government of Saratov, Russia, 70 m. E. of the Volga, and 130 sq. m. in extent. It yields annually upward of 100,000 tons of salt, the collection of which gives employment to 10,000 persons. In the hottest season the crystallized salt along its banks and on its surface gives it the appearance of a vast sheet of ice or frozen snow. It is nowhere more than 15 inches deep.

ELVAS, a fortified frontier town of Portugal, in the province of Alemtejo, 10 m. W. of Badajos, on a hill near the bank of the Guadiana; pop. 16,460. It is an important stronghold, having an arsenal, and spacious bomb-proof barracks. The fort of La Lippe on a neighboring hill is deemed impregnable. The town itself is poorly built, and many of the venerable Moorish buildings which line its streets are crumbling to pieces. It is supplied with water from a distance of 3 miles, by means of a fine Moorish aqueduct. During the peninsular war in 1808 Elvas was taken by the French under Marshal Junot, and held during several months.

ELVES, genii of the northern mythology, forming, according to some classifications, with the undines, salamanders, and gnomes, groups of elementary sprites identified respectively with the water, fire, earth, and air. The elves are of the air, and have been more widely received in the faith and poetry of Europe under this name than under their Hellenic name of sylphs. They are capricious spirits, of diminutive size but preternatural power. Their stature is less than the size of a young girl's thumb, yet their limbs are most delicately formed, and when they will they can hurl granite blocks, bind the strongest man, or shake a house. They are divided in the sagas into good and bad, or light and dark elves, the former having eyes like the stars, countenances brighter than the sun, and golden yellow hair, the latter being blacker than pitch, and fearfully dangerous. The elves ordinarily wear glass shoes, and a cap with a little bell hanging from it. Whoever finds one of these slippers or bells may obtain from the elf who has lost it any thing which he asks for. In the winter they retire to the depths of mountains, where they live in much the same way as men, and in the first days of spring issue from their grottoes, run along the sides of hills, and swing upon the branches of the trees. In the morning they sleep in blossoms or watch the people who pass by, but at the evening twilight they meet together in the fields, join hands, and sing and dance by the light of the moon. They are generally invisible, but children born on Sunday can see them, and the elves may extend the privilege to whomsoever they please. In England and Scotland they were subject to a king and queen. The islands of Stern and Rugen, in the Baltic, are especially subject to the king of the elves, who rides in a chariot drawn by 4 black horses, and whose passage from island to island is recognized by the neighing of the steeds, the blackness of the water, and the bustle of the great aërial company who follow in his train. The elves sometimes become domestic servants, and would be valuable as such

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if they were less easily offended and less dangerous after taking offence. As long as their caprices are gratified, their food and drink regularly left at an appointed place, and no attempt made to interfere with their freedom, the furniture is sure to be dusted, the floor to be swept, and every chamber to be perfectly in order. But the brothers Grimm, in their *Deutsche Sagen*, have chronicled the misfortunes of many a young girl, who, having called an elf to her aid, repented too late of having offended it. The brownie of Scottish fame is one of these domestic elves.

ELWES, John, an English miser, born in Southwark about 1712, died Nov. 26, 1789. His own family name was Meggot, but he exchanged it for that of his uncle, from whom he received a large inheritance. At an early period of his life he attended Westminster school, and became a good classical scholar, though at no subsequent period was he ever seen with a book. He was sent to Geneva to complete his education, and there distinguished himself as one of the boldest riders in Europe. After returning to England he began to indulge in gambling, frequenting the most noted gaming houses, and sitting up whole nights with the most fashionable and profligate men of the time. After thus making or losing thousands, he would go to the cattle market at Smithfield and dispute with the butchers for a shilling. He next took to hunting, and his stable of foxhounds was considered the best in the kingdom, yet he kept but a single servant to attend to all his cows, dogs, and horses. From his parsimonious mode of life his fortune rapidly increased, and when worth half a million he refused to accept a seat in parliament unless on the express stipulation that he should be brought in for nothing, and, owing to peculiar circumstances, was actually elected. His miserly habits increased with his fortune, and during the latter years of his life he abandoned gaming, hunting, and every comfort, and died the possessor of £800,000, after having suffered greatly from fear of poverty.

ELY, a city of Cambridgeshire, England, on an eminence near the Ouse, 16 m. N. N. E. from Cambridge; pop. in 1851, 6,176. It consists principally of one street, and contains many old buildings. It is the seat of a bishopric which was founded in 1107. Its cathedral is a splendid structure, built in successive centuries, and presenting a singular mixture of the Saxon, Norman, and early English styles of architecture. The churches of St. Mary and of the Holy Trinity are also remarkable both for their age and splendor. A famous convent was founded here about 670 by Ethelreda, wife of Oswy, king of Northumberland, and she became its first abbess. It was destroyed by the Danes in 870, and 100 years later was rebuilt by Ethelwold, bishop of Winchester, who placed in it monks instead of nuns. Ely has important manufactures of earthenware and tobacco pipes, extensive gardens in its vicinity, the produce of which is sent to the London and Cambridge markets, and several benevolent institutions and schools, among which is a grammar school founded by Henry VIII. It is the capital of a division of Cambridgeshire, called the "isle of Ely," separated from the rest of the county by the Ouse. This district is included in the reclaimed marsh known as Bedford Level.

ELYMAIS, in the Bible Elam, now Luristan, a province of Susiana, now Khoozistan, in Persia, a mountainous region, watered by the Eulæus (Heb. *Ulai*), and inhabited by a people of Semitic descent (Genesis x. 22). The people of Elam appear as bold and rude mountaineers, skilled in archery, and are often mentioned in connection with some warlike expedition, from the battle of Chedorlaomer, in the time of Abraham, down to the conquest of Babylon by the Medes and Persians. In Isaiah (xxi. and xxii.), we see them marching with their mighty quivers, with chariots and horses, to fatal sieges; in Jeremiah (xlix.), we see their bow, their chief strength, broken; in Ezekiel (xxxii.), we find them among those inhabitants of the nether world who had spread their terror among the living. (See Susiana.)

ELYSIUM, or Elysian Fields, among the Greeks and Romans, the dwelling place of the blessed after death. While the oriental and most other peoples sought this abode in the upper regions of the sky, the Greeks placed it in the west on the ends of, or beneath, the earth, where the sun goes down. According to Homer, Elysium was a plain on the ends of the earth, where men live without toil or care, where there is neither snow, nor winter storms, nor rains; where the lovely and cooling zephyrs blow unceasingly with light murmur, and where dwelt Rhadamanthus, who, in the upper world, was the justest of men. The position of Elysium changed with the progress in geographical knowledge, proceeding further and further to the west. Hesiod speaks of the happy isles of the ocean, and other writers supposed it to be somewhere in the Atlantic, till Pindar and the later poets put it beneath the earth. According to the later descriptions, the meads of Elysium 3 times in a year brought forth the most beautiful flowers. The inhabitants enjoyed the reward for their virtues on earth, and whoever had 3 times resisted a temptation to do evil attained to this abode. A never-setting sun shone upon them, and melancholy was removed far away. The airs, fragrant and tinted with purple, breathed softly from the sea, the flowers were twined into wreaths for the dwellers, peaceful wavelets rivers flowed by, and horse races, games, music, and conversation, occupied the hours. According to Homer, Rhadamanthus alone ruled Elysium, being admitted there on peculiar grounds as the representative of the idea of justice. Hesiod knows Elysium only by the name of the isles of the Blessed, where Kronos rules, and the Titans and other Homeric heroes dwell.

ELZEVIR, or more properly Elsevier or Elzevier, the name of a family of Dutch print-

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ers, established at Leyden, Amsterdam, the Hague, and Utrecht, in the 16th and 17th centuries, and who for nearly a hundred consecutive years were distinguished for the number and elegance of the publications, especially the editions of ancient authors, which issued from their press.—Louis, the founder of the family, born in Louvain in 1540, emigrated to Holland in 1580, in consequence of the religious troubles which agitated his native city, and settled in Leyden, where he died, Feb. 4, 1617. He became a petty officer of the university of Leyden, and also engaged in the business of a bookseller and printer. In the latter capacity he is said to have produced, between 1583 (when the *Druiii Ebraicarum Quæstionum ac Responsionum libri duo*, the first book bearing the imprint of Elzevir, appeared) and his death, 150 works. He is said to have been the first printer who observed the distinction between the vowels *i* and *u* and the corresponding consonants *j* and *v*. Of the 7 sons of Louis, 5 followed the business of their father, viz.: Matthieu, who was established at Leyden, where upon his death in 1640 he was succeeded by his son Abraham; Louis (II.), who in 1590 established a printing house at the Hague, and died there in 1621; Gilles, who was in business at the Hague and subsequently in Leyden; Joost, who settled in Utrecht; and Bonaventure, born in 1583, died in 1652. In 1626 the last named entered into a partnership with his nephew Abraham, the son of Mattheus, at Leyden, which terminated only with their deaths in 1652, within a month of each other. They were the most distinguished of the family, and from their press issued those numerous exquisite little editions of the classics, as also those on history and politics (62 vols. 16mo.), called by the French *Les petites républiques*, with which the name of Elzevir is now most familiarly associated. The Livy and Tacitus of 1634, the Pliny of 1635, the Virgil of 1636, and the Cicero of 1642, are among the best of their productions. The business was carried on for two years by Jan, the son of Abraham, and Daniel, the son of Bonaventure; afterward by Jan alone, and by his widow. Louis (III.), son of Louis (II.), founded the Elzevir printing establishment at Amsterdam in 1638, entered into a partnership with his cousin Daniel in 1654, which lasted 10 years, and died in 1670, at which time the reputation of the Elzevirs had reached its highest point. Among their chief publications are the celebrated New Testament of 1658, a series of Latin classics, the *Etymologicon Linguæ Latinæ*, and an edition of the *Corpus Juris*. Between 1664 and 1680, the year of his death, Daniel carried on the business alone, and in that period published 152 works. He was the last of his family who excelled in printing, although his widow and Pieter, grandson of Joost, carried on the business for some years.—The merit of the Elzevirs consisted less in their learning or critical abilities, in which they were inferior to the Aldi, the Stephenses, and others of the celebrated printers of the 15th, 16th, and 17th centuries, than in the clearness and beauty of their type, the excellent quality of their paper, made in Angoulême, and in the general elegance of their publications. The texts of their editions of the classics were not founded on or collated by old manuscripts, as were those of many of their predecessors, who were scholars as well as printers, but were generally reprints, and were sometimes pirated from other sources. All their choice works, particularly the small editions of the classics, bring large prices at the present day; and the name Elzevir applied to a book has become a synonyme for typographical correctness and elegance. The Elzevirs printed several catalogues of their works, but the best account of them is to be found in the *Notice de la collection d'auteurs Latins, Français, et Italiens, imprimée de format petit en* 12*mo. par les Elzevier*, in Brunet's *Manuel du libraire* (Paris, 1820), and in Bérard's *Essai bibliographique sur les éditions des Elzevirs* (Paris, 1822). See also Pieter's *Annales de l'imprimerie Elzévirienne* (Ghent, 1851–'52), in which the number of works printed by the Elzevirs is stated at 1,213, of which 968 were in Latin, 44 in Greek, 126 in French, 32 in Flemish, 22 in oriental languages, 11 in German, and 10 in Italian. Their imprint was: *Apud Elzevirios*, or *Ex Officina Elzeviriorum* or *Elzeviriana*; and frequently the title page of their books contains a device of a blazing wood pile, emblematic of their name, compounded of *els*, alder, and *vuur*, fire.

EMANCIPATION. See Slavery.

EMANUEL, an E. co. of Ga., bounded N. by the Ogeechee river, and S. W. by Pendleton's creek; area, about 1,000 sq. m.; pop. in 1852, 4,883, of whom 1,009 were slaves. The principal streams which intersect it are the Great Ohoopee and the Cannouchee. It has a level surface, and a sandy, unproductive soil. Timber is abundant. Cotton, grain, and potatoes are the chief agricultural staples, and in 1850 the county yielded 559 bales of cotton, 121,874 bushels of Indian corn, 2,259 of oats, and 49,339 of sweet potatoes. There were 17 churches, and 202 pupils attending public schools. Value of real estate in 1856, $684,372. The county was organized in 1812. Capital, Swainsborough.

EMANUEL (Port. Manuel) I., king of Portugal, called the Great, and the Happy, born in Alconchete, May 3, 1469, ascended the throne upon the death of John II. in 1495, died in Lisbon, Dec. 13, 1521. He was the son of Duke Ferdinand of Viseu, grandson of King Edward of Portugal, nephew of King Alfonso V., and cousin of John II. His father, accused of conspiracy against John II., was slain by the latter with his own hand. Emanuel, bearing the title of the duke of Beja, was educated in Spain, where he married Isabella, daughter of Ferdinand and Isabella, and heir to the crown of Castile; after whose death in 1498 he married Donna Maria, her sister. He received the kingdom from his predecessors in a state of prosperity, and by his activity and sagacity raised

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Portugal to her most brilliant point of power and glory. He signalized the beginning of his reign by pursuing with an ardor surpassing that of all his predecessors the long-sought passage by sea to India. Mainly under his patronage were made the voyages of Vasco da Gama, Albuquerque, and Pedro Alvarez de Cabral; in his reign Goa became a Portuguese settlement, and Brazil, the Moluccas, &c., were discovered; the commerce of the Indies was opened to Portugal, wealth accumulated, and a spirit of enterprise took possession of the nation, which could now boast of a brilliant succession of navigators and generals. Less successful were Emanuel's efforts for conquest in Morocco, where dearly purchased victories secured no lasting gain. He zealously devoted himself to the interests of the Roman Catholic church, sent missionaries on board all his fleets to convert whatsoever people they might discover, and sought to reform the character of the Portuguese ecclesiastics at home. He persecuted the Jews, banished the Moors, and introduced the inquisition. Though he ruled 20 years without convening the cortes, his home administration was marked by justice, and he gave completeness to the institutions of his kingdom by publishing a code of laws. He succeeded in remaining at peace with all Europe, and even preserved a difficult neutrality toward Francis I. and Charles V. He was a patron of men of letters, and himself the author of memoirs of the Indies. He was thrice married, his last wife being Eleonora of Austria, sister of Charles V.

EMBALMING (Gr. *βαλσαμον*, balsam or balm, from the resinous substances employed in the operation), the process of preserving animal bodies from corruption by introducing antiseptic substances into the spaces left vacant by the removal of the internal parts. The art was extensively practised by the ancient Egyptians, and the mummies found at this day in their sepulchres, where they have lain for 3,000 years or more, testify to the perfection it had reached in those remote periods. With them it was not limited to the preservation of human bodies alone, but no reptile appears to be so mean as not to have been held sacred and worthy of this care of its remains; and when, in addition to the countless bodies of human beings still to be found in the places where they were deposited, are reckoned the millions of dogs, apes, crocodiles, cats, ibises, bulls, rams, foxes, asps, &c., of more than 50 species in all, it is a matter of wonder whence were obtained all the resins, drugs, spices, &c., which are described as essential to the process. After Egypt became a Roman province the art continued to be practised, and was adopted to some extent by the Romans themselves. Among other races also the same practice has in former times prevailed; or at least a modification of it designed to produce a similar result; such, for example, as drying the bodies of the dead. This was probably the custom of the Guanches, the former inhabitants of the Canary islands. The ancient Peruvians preserved the bodies of their incas, according to Garcilasso, "perfect as life, without so much as a hair or an eyebrow wanting." In the great temple of the sun at Cuzco their bodies, ranged on one side, and those of their queens on the other, sat clothed in their former princely attire upon chairs of gold, their heads inclined downward, covered with raven black or silver gray hair, and their hands placidly crossed over their bosoms. (Prescott's "Conquest of Peru," vol. i., p. 33.) Exposure of the bodies to the exceedingly dry and cold air of the mountainous region, it was thought by Garcilasso, was sufficient to preserve these bodies without recourse to the artificial processes adopted by the Egyptians. These have been particularly described by Herodotus and Diodorus Siculus, and the accounts of the former especially have been regarded by most authorities as presenting an exact exposition of them. Some, however, question the adequacy of the processes thus given to account for the results, and state that modern experimenters fail entirely of success in endeavoring to perform the operation by their instructions. The account given by Herodotus (ii. 86), is as follows: "There are a set of men in Egypt who practise the art of embalming, and make it their proper business. These persons, when a body is brought to them, show the bearers various models of corpses, made in wood, and painted so as to resemble nature. The most perfect is said to be after the manner of him [Osiris] whom I do not think it religious to name in connection with such a matter; the second sort is inferior to the first, and less costly; the third is the cheapest of all. All this the embalmers explain, and then ask in which way it is wished that the corpse should be prepared. The bearers tell them, and having concluded their bargain, take their departure, while the embalmers, left to themselves, proceed to their task. The mode of embalming, according to the most perfect process, is the following: They take first a crooked piece of iron and with it draw out the brain through the nostrils, thus getting rid of a portion, while the skull is cleared of the rest by rinsing with drugs; next they make a cut along the flank with a sharp Ethiopian stone, and take out the whole contents of the abdomen, which they then cleanse, washing it thoroughly with palm wine, and again frequently with an infusion of pounded aromatics. After this they fill the cavity with the purest bruised myrrh, with cassia, and every other sort of spicery except frankincense, and sew up the opening. Then the body is placed in natrum for 70 days, and covered entirely over. After the expiration of that space of time, which must not be exceeded, the body is washed, and wrapped round from head to foot with bandages of fine linen cloth, smeared over with gum, which is used generally by the Egyptians in the place of glue, and in this state it is given back to the relatives, who enclose it in a wooden case which they have had made for the purpose, shaped into the figure of a man. Then fastening the case, they place it in a sepulchral chamber, up-

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right against the wall. Such is the most costly way of embalming the dead. If persons wish to avoid expense and choose the second process, the following is the method pursued: Syringes are filled with oil made from the cedar tree, which is then, without any incision or disembowelling, injected into the abdomen. The passage by which it might be likely to return is stopped, and the body laid in natrum the prescribed number of days. At the end of the time the cedar oil is allowed to make its escape; and such is its power that it brings with it the whole stomach and intestines in a liquid state. The natrum meanwhile has dissolved the flesh, and so nothing is left of the dead body but the skin and the bones. It is returned in this condition to the relatives, without any further trouble being bestowed upon it. The third method of embalming, which is practised in the case of the poorer classes, is to clean out the intestines with a clyster, and let the body lie in natrum the 70 days, after which it is at once given to those who come to fetch it away." Both with the Egyptians and Peruvians the same practice is said to have obtained of preserving all the internal parts extracted from the body in vases deposited near the mummies. Dr. Cormack of London, who has recently investigated the subject, is of opinion that the essential part of the process was the application of heat to the bodies, which were filled with some form of bitumen. By this means creosote was generated and diffused throughout all tissues of the body, and this method was never divulged, while the other operations may have been practised the better to conceal this, as well as to add dignity and mystery to the art.—The substances found in mummies are altogether of a resinous nature, and the tissue is impregnated with resinous matter; but this and the wine said to be employed could not preserve the animal substance. All parts, and the linen used for enveloping the body in folds sometimes of 1,000 yards, bear the marks of heat; the bandages are commonly reduced almost to tinder. The object of the gum with which they were smeared may have been to produce creosote by the calcination to which they were subjected. Bitumen also appears to have been employed in a liquid state for filling the cavities of the bodies, though no mention is made of heat being applied to effect its decomposition. The cost of the most expensive method of embalming was a talent of silver, about £187 10s., or, according to Calmet, about £300; £60 was a moderate price.—Thénard's "Chemistry" contains a description of a method employed in recent times by Dr. Chaussier. The body, thoroughly emptied, and washed in water, is kept constantly saturated with corrosive sublimate. The salt gradually combines with the flesh, gives it firmness, and renders it imputrescible and incapable of being injured by insects and worms. The author states that he had seen a head thus prepared, which for several years had been exposed to the alternations of sun and rain without having suffered the slightest change. It was very little deformed, and easily recognized, although the flesh had become as hard as wood. A process has been introduced into France by J. N. Gannal of injecting a concentrated solution of sulphate of alumina into the veins of the body, which is employed for anatomical preparations as well as for embalming. Dr. Ure states that a solution of chloride of mercury and wood vinegar is most efficacious for similar uses. He is also of opinion from the statements of Pliny, that wood vinegar, the antiseptic virtue of which is in the creosote it contains, was the essential means employed by the ancient Egyptians in preparing their mummies, and that the odoriferous resins were of inferior consequence. M. Falconi, in a paper read to the French academy, states that after a series of experiments made with different salts, he finds that sulphate of zinc, prepared of different degrees of strength, is the best material. An injection of about a gallon would perfectly well preserve a dead body, as is proved by the preparations belonging to the anatomical cabinet at Genoa. Bodies so prepared preserve all their flexibility for 40 days. It is only after that period that they begin to dry up, still preserving, however, their natural color. Chloride of zinc and sulphate of soda are sometimes used also.

EMBANKMENT. See DIKE.

EMBARGO (Sp. *embargo*, an impediment), a public prohibition forbidding ships to sail, generally adopted with a view to impending hostilities. In 1794 the American congress laid an embargo for 60 days upon all vessels in the ports of the confederation. This was said by the opponents of the measure to be done to obstruct the supply of provisions to the British forces in the West Indies, then engaged in hostilities against the French republic. But the embargo most famous in American history is that intended to countervail Napoleon's Berlin and Milan decrees and the British orders in council. On Dec. 22, 1807, on the recommendation of President Jefferson, a law was enacted by congress prohibiting the departure from the ports of the United States of all but foreign armed vessels with public commissions, or foreign merchant ships in ballast, or with such cargo only as they might have on board when notified of the act. All American vessels engaged in the coasting trade were required to give heavy bonds to land their cargoes in the United States. This embargo was repealed by an act passed Feb. 27, 1809, and taking effect March 15, 1809, except so far as related to France and Great Britain and their dependencies; and in regard to them also it was to take effect after the conclusion of the next succeeding session of congress. A 3d embargo, laid April 4, 1812, was superseded by the declaration of war against England, June 18, 1812. A 4th embargo was laid by act of Dec. 19, 1813, prohibiting all exports whatever, and even stopping the coasting trade; fishermen were required to give bonds not to violate the act. This was repealed 4 months afterward.

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EMBER DAYS, certain days set apart by the church as early as the 3d century for the purpose of prayer and fasting. They are the Wednesday, Friday, and Saturday after the 1st Sunday in Lent, after the feast of Whitsunday, after the 14th of September, and after the 13th of December. The weeks in which these days fall are called ember weeks. The name is probably of Anglo-Saxon derivation, meaning the circular days, and in the canons they are termed the *quatuor anni tempora*, the 4 cardinal seasons. Some, however, have supposed the name to be taken from the ancient custom of using ashes or embers in connection with fasting.

EMBEZZLEMENT, the wrongful appropriation of the goods of another, differing from larceny in this, that in the case of embezzlement the property is in the possession or control of the wrong doer. It was therefore not an indictable offence at common law, and the owner of the property embezzled had no other remedy but a civil action for damages, or in some cases for the recovery of the property itself. Thus if a man hired a horse and fraudulently sold him, if the sale was made in the usual course, *i. e.* in market overt, and there was nothing to put the purchaser upon his guard, the sale was valid, and the owner could only recover damages against the man who had committed the fraud; but if a horse had been stolen, although it should afterward have been sold in market overt, the title did not pass, and the owner could reclaim his property. It has never been settled by a positive rule of general application what would be sufficient notice to the purchaser in the case of a fraudulent sale of property intrusted to another. Any circumstance that should have put him upon inquiry would be deemed equivalent to actual notice, and in such a case the sale would not be deemed *bona fide*. Whenever there are circumstances indicating that there is possession without property or only for a special purpose, as in the case of a pawnbroker or common carrier, the rule would apply that the purchaser takes the risk of any fraud that may be committed by the seller. So in cases of sale by the owner, but of non-compliance with the conditions of sale by the vendee, a difficult question sometimes arises. Actual delivery of the property to the vendee with the intention of giving him the ownership, even if such delivery was obtained by fraudulent representations, or if a fraud was committed by not paying for the property, if the price was payable on delivery, still transfers the right of property so far that the fraudulent vendee can make a valid sale to another person who is ignorant of the fraud; but the owner will have the right to reclaim the property from the vendee himself so long as it is in his possession, unless a claim by creditors of the vendee should intervene. Thus, although stolen property could be reclaimed, in whose hands soever it should be found, yet in the case of embezzlement, which was in fact a greater offence than larceny, the ownership might be lost; nor was the offender punishable criminally, except in the case of a common carrier who should break open a cask, bale, or package of goods, and appropriate a part of the contents, or should carry off the entire cask, bale, or package after it had been brought to its destination, which appropriation or carrying off was held to be larceny. To remedy this defect, various statutes have been enacted whereby the embezzling of the goods of a master by a servant, or by a clerk or person employed, provided such servant or clerk had the custody of the goods, was made felony; so of a guest in an inn, or a lodger in furnished rooms, carrying off any of the effects which he had possession of for use, it was declared to be larceny. Severe penalties were also enacted against embezzlement by clerks in the post office, or by brokers, bankers, attorneys, &c., of any moneys or valuable securities placed in their hands for safe keeping or any special purpose. In the state of New York these provisions have been adopted with some amplification. The embezzling of property, or the converting of it to his own use, by a clerk or servant of any private person or co-partnership, or by any officer, agent, clerk, or servant of an incorporated company, which shall have come into his possession or under his care, is made punishable in like manner as larceny. It is also enacted that a carrier shall be punishable for embezzling goods in the mass without breaking the package, box, &c., before delivery at the place of destination, in like manner as if he had broken such package, in which latter case he was, as before mentioned, liable at common law. (See 2 Rev. Stat. 678, 679.)

EMBLEMENTS, a term applied to the growing crops of land, when the estate of a tenant for life has expired by the death of the tenant, or when an estate at will has been determined by the lessor. In either case the emblements belong to the tenant or his legal representatives. But when the estate is determined by the lease itself, as when there is an estate for a term of years, the rule is otherwise; for the law does not relieve a man from the consequences of his own voluntary act.

EMBOSSING (Fr. *bosse*, a protuberance), the art of producing raised figures upon plane surfaces, as upon leather for book-binding; upon paper, as stamped envelopes; upon wood in architecture, and bronze, &c., in sculpture. In the two last-named arts, according as the figures are more or less prominent, they are said to be in *alto*, *mezzo*, or *basso rilievo*. Various methods and machines are in use for producing this effect. Leather, paper, and the textile fabrics are embossed by powerful presses, furnished with dies, which give their pattern to the object to be embossed. The press of Messrs. R. Hoe and co. of New York is of very simple and powerful construction. The power is applied by a treadle to straighten a bent arm, as in the old form of the printing press, and the hands of the operator are thus at liberty. Steam is introduced to keep the plate at the temperature

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found most suitable. A very ingenious method of embossing wood was introduced in 1824 by Mr. J. Straker of London. The pattern being drawn upon its surface, the parts intended to be in relief are sunk by the application of a blunt steel tool as deep into the wood as they are intended to appear raised above the surface, care being taken not to injure the grain of the wood. The surface is next planed or filed down to the level of the depressed portions. The wood then being placed in water, the compressed parts rise and remain permanently in their original position, and the work is finished by carving as ordinarily practised. A method of softening wood, so that it shall receive impressions from iron moulds into which it is forced, has recently attracted much notice in Paris. The wood is softened by steam, and some ingredients are added to increase its ductility. The bass-relief impressions are said to be sharp and permanent, and to project from 4 to 5 millimetres. The art is named xyloplasty.

EMBRACERY, an attempt to influence a juror by any unlawful consideration, as by private influence or by bribery. This was a criminal offence at common law, though the punishment has been prescribed by different statutes in England. The term is not used in the statutes in the United States, but the offence itself is subject to a penalty. In the state of New York the attempt to corrupt a juror, referee, or arbitrator, by a gift or gratuity, is punishable by imprisonment in the state prison for a term not exceeding 5 years; and so also the receiving of such gift or gratuity by a juror, referee, or arbitrator, is punishable in like manner.

EMBROIDERY, the art of working silk, woollen, cotton, or linen threads with a needle into woollen, muslin, or other fabric. It is of two sorts: embroidery on stuffs, with colored threads, sometimes with the introduction of gold and precious stones, which is done on a loom or frame, chiefly for tents, curtains, housings, &c.; and embroidery on muslin or some delicate fabric, with linen or cotton threads, for the female dress. The latter is worked either by a pattern drawn upon the fabric itself, or by stretching it over a pattern drawn on paper. Tents, which are so much used among the wandering tribes of the East, are often richly adorned by the embroiderer. A tent of a late king of Persia, said to have cost £2,000,000, "was embroidered with burnished gold, studded with precious stones and diamonds, interspersed with rubies and emeralds set with rows of pearls; and there were painted thereon specimens of every created thing, birds and trees, and towns, cities, seas, and continents, beasts and reptiles." The art of embroidery was practised at a very early period, as we find from mention made of it by both sacred and profane writers. Instructions were given to the Hebrews for embroidering the curtains for the tabernacle, with such magnificence that we have reason to suppose that their knowledge of the art was very great. (Exodus xxvi. 1–31; see also xxxix. 2–8, &c.) It is probable that they acquired it in Egypt, where it was commonly practised. They also made an embroidered coat of fine linen, and a girdle of needle-work, for Aaron. The Babylonians were celebrated for the beauty of their embroidered draperies, but this art seems to have been very generally known among the Asiatic nations. The women of Sidon had acquired great celebrity for their skill in ornamental needle-work long before the Trojan war; and the Grecian women at a later period attained to such a degree of perfection in this accomplishment, that their performances were said to equal the finest paintings. The Phrygians were supposed to be the inventors of this art, and by them it was probably first introduced into Greece. In later times the Moguls were celebrated among all the eastern nations for the splendor of their embroideries, their floors, as well as their walls and couches, being covered with fabrics richly wrought and inlaid with gold and precious stones. At the great exhibition of 1851 the finest specimens of modern embroidery were from Turkey. Embroidery upon canvas with the brilliantly dyed wools of Germany is much practised by the women of America as well as of Europe. The variety and delicate shadings of their colors furnish every tint which can be required for the imitation of the most beautiful objects in nature. The Chinese are at the present day the most indefatigable embroiderers, and their work is always executed with the greatest neatness and regularity; but among the French and Germans the art has been cultivated with wonderful success, and furnishes not merely a pretty occupation for the ladies of those countries, but gives the means of support to a large portion of the population. In England, Scotland, and Ireland, also, it is carried on to a great extent. A machine was invented in 1834, by which one person was able to execute the most difficult and intricate patterns, using 130 needles, all kept in motion at once. It was supposed that this would entirely supersede the old-fashioned method of hand working, but in 1857 one house in Glasgow is said to have employed upward of 30,000 men and women in Scotland and Ireland in the embroidery of muslins, all the work being done by hand, as the machines failed, or proved too expensive. Over 50 firms were engaged in the business, and about £750,000 a year was paid in wages to females in the west of Scotland and in Ireland. From a paper read before the society of arts in London in 1859, it appears that certain difficulties which seemed almost insurmountable in embroidering by machinery had been overcome, and the manufacture was successfully conducted in the establishment of Messrs. Houldsworth of Manchester. The machine was an improvement on that originally contrived by M. Heilmann. A pantagraph was used to copy the pattern to the scale required. Each machine was usually worked by 3 young women and 2 girls. The advantages of its use were the rapidity, accuracy, and ex-

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cellence of work in the production of repetitions of the design in borders, flounces, and trimmings for dresses, and the perfect embroidery of a pattern on each side of the fabric, especially useful in window curtains, table covers, and trimmings for upholstery.

EMBRYOLOGY, the study of the mode of formation and development of the animal fœtus. The progress of our knowledge on this subject has been marked by several well defined epochs, corresponding with the successive discoveries of as many different investigators. Though many important facts bearing upon embryology were known to the earlier anatomists and physiologists, they were often misinterpreted, and their true relations consequently mistaken. Aristotle and his followers recognized three different modes of generation as occurring among animals, viz.: oviparous, viviparous, and spontaneous generation. Oviparous generation was that form in which the female parent produced eggs, from which the young were hatched, as in most fish, reptiles, and birds. Viviparous generation was that in which the young were discharged alive and fully formed from the body of the parent, as in quadrupeds and the human species; while spontaneous or equivocal generation was that in which certain animals of a low order, such as worms, insects, parasites, maggots, &c., were supposed to be produced spontaneously, without parents, from the soil, the water, or decaying animal and vegetable substances. By the progress of investigation, however, the last mode of generation was shown to be much less frequent in its occurrence than Aristotle had supposed. The first advance in this direction was made about the end of the 17th century, when Redi, an Italian naturalist, studied with care the generation and metamorphoses of insects, showing that many worms and maggots, instead of being produced without parents, were in reality hatched from eggs laid by perfect insects, and that they afterward became transformed, by the process of growth, into similar forms. He also in 1684 showed that most parasitic animals were provided with sexual organs, and produced their young in the same manner with other and larger species. Valisnieri soon afterward (1700) extended the observations of Redi, and applied the same conclusions to other species of insects, and to the parasites inhabiting vegetables. In this way the number of species in which spontaneous generation was regarded as possible or probable gradually diminished, as zoological science became more extended and more accurate; until, in 1837, Schultze demonstrated, by his experiments upon the infusoria, that even these microscopic animalcules are never produced in situations where their germs neither existed before nor could gain access from without. Since then it has been generally acknowledged by physiologists that spontaneous generation is a thing unknown in nature, and that the supposed instances of its occurrence are only cases in which the real process of generation has not been sufficiently investigated. The distinction between oviparous and viviparous animals was also supposed by the ancients to indicate a fundamental difference in their mode of generation. In oviparous animals the eggs were known to be produced by the female, and fecundated by the male, after which the young were hatched from them by incubation. In the viviparous species the embryo was thought to be produced by a mixture of the male sperm with the fluids of the female generative organs; some thinking that the material for the body of the embryo was supplied by the menstrual blood, others that it came from a kind of female sperm, or seminal fluid secreted by the female organs. In 1651 Dr. William Harvey, in his book on generation, first announced the fact that there is no essential difference in the mode of generation between oviparous and viviparous animals, but that "all animals whatsoever, even the viviparous, and man himself not excepted, are produced from ova." But though the truth of this opinion has since been amply confirmed, and its expression (*omne animal ex ovo*) has now passed into a physiological aphorism, yet it was not intended by Harvey precisely in the sense which is now given to it. Harvey never saw the unimpregnated eggs of the quadrupeds, nor did he have any idea of the real structure and function of the ovaries in these animals; and in stating the opinion that the young of the vivipara and of man were produced from eggs, he only meant to say that after sexual intercourse and conception, the first thing produced in the uterus was not the embryo, but rather resembled an egg; and that the embryo was afterward formed from this, by the process of growth. In 1672 Régnier de Graaf showed that the ovaries, in women and in female quadrupeds, were filled with globular vesicles, visible to the eye, similar in appearance to the eggs of birds and fishes. These vesicles he pronounced to be eggs; and the organs in which they were found then took the name of ovaries. A century and a half later (1827) Ch. Ernst von Baer discovered, by the microscope, the real egg of the human female and of the viviparous animals, which is contained in the interior of the vesicles of De Graaf. These eggs were shown to exist in the ovaries of virgin females, as well as of those in whom sexual intercourse had taken place; and it was accordingly demonstrated that, in all animals and in man, the eggs are formed originally in the ovaries of the female, independently of the male; and that these eggs are afterward fecundated, and developed into embryos. Another important discovery remained to complete our knowledge on this part of the subject, viz., that of the spontaneous ripening and discharge of the eggs, in quadrupeds and in man. Négrier, Pouchet, and Bischoff demonstrated (1840–'2–'3) that the eggs of the female, originally produced in the ovaries, ripen and are discharged, independently of sexual intercourse, at certain regular periods; and that the impregnation of these eggs by the male sperm is a subsequent process, taking place after the eggs have

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left the ovary and entered the Fallopian tubes. The origin of the embryo accordingly takes place in the same manner in all classes of animals, viz.: from an egg, which is produced in the ovary of the female, discharged thence at certain definite periods, and afterward fecundated by contact with the spermatic fluid of the male; and the only real difference between oviparous and viviparous animals is that in the former species (ovipara) the fecundated egg is discharged from the body of the female and deposited in a nest, or other suitable receptacle, in which it is afterward hatched; while in the latter (vivipara) it is retained in the body of the female, and there nourished during the development of the embryo. The egg, at the time of its discharge from the ovary, consists of a globular vitellus or yolk, surrounded by a membrane termed the vitelline membrane. In very many instances this becomes surrounded, while passing downward through the Fallopian tubes or ducts, with a layer of transparent albuminous matter; as for example, in the eggs of frogs, tritons, &c. In other cases, in addition to the albuminous matter, certain membranous coverings are deposited round the egg, of a fibrous and calcareous texture, as in birds and the scaly reptiles. In all instances, however, it is the vitellus which is the essential part of the egg, and that from which the embryo is directly produced.—The first change which occurs after the impregnation of the egg, is a spontaneous division or segmentation of the vitellus. The vitellus divides successively into smaller and smaller portions, in such a way as to produce at last a multitude of minute flattened bodies or cells, which are attached edge to edge, and which form accordingly a continuous membrane, which is called the blastodermic membrane. In eggs which have a large-sized yolk, as those of the birds, lizards, and turtles, the formation of the blastodermic membrane begins at a particular spot on the surface of the vitellus, termed the *cicatricula*, and thence spreads in every direction, so as to enclose gradually all the rest of the yolk. But in those which are of minute size, as in quadrupeds and the human species, the whole vitellus is converted into the blastodermic membrane, which after its formation encloses only a small cavity filled with transparent, watery fluid. The blastodermic membrane then becomes variously altered and developed in different parts, so as to form the various organs and tissues of the embryo. A line or furrow first shows itself, in the thickest and most condensed portion, known as the primitive trace. This indicates the future situation of the spinal column; and the different parts of the vertebræ gradually grow around it, forming a chain of cartilaginous rings, with transverse and oblique processes, which envelope the primitive trace or furrow, and convert it into a closed canal, large and rounded at the anterior extremity, or head, but narrow and pointed at the posterior extremity, or tail. In this canal the brain and spinal cord are formed and complete the development of their various parts. At the same time, the remainder of the blastodermic membrane becomes more condensed and organized, forming the integument and muscles of the chest and abdomen; and these portions finally unite with each other in front, forming at the point of junction a longitudinal or rounded cicatrix, known as the umbilicus. The alimentary canal, formed in the interior of the abdominal cavity, is at first entirely closed; but two openings are afterward formed, one at the anterior extremity of the body, the other at the posterior. These openings become the mouth and anus. In frogs, tritons, and some kinds of fish, all these changes take place after the eggs are discharged from the body of the female. In birds and turtles, the segmentation of the vitellus and the formation of the blastodermic membrane are already far advanced at the time the eggs are laid. In the lizards, most serpents, and some kinds of cartilaginous fish, the development of the embryo takes place partly while the egg is still in the generative passages of the female, and partly after its expulsion. In a few species of serpents, and in some fish, the embryo is completely developed within the egg in the body of the female, so that the young are finally brought forth alive; while in all the warm-blooded quadrupeds, as well as in the human species, the fecundated egg is also retained in the uterus until the embryo is sufficiently developed to be born alive.—In the frog, the eggs are deposited in the early spring, in some shallow pool, freely exposed to the light and air. Immediately after their expulsion the albuminous matter with which they are surrounded absorbs water and swells up into a tremulous gelatinous mass, which floats near the surface, with the eggs imbedded in its substance. The formation of the embryo then goes on as above described, and the young animal, at first curled up in the interior of the vitelline membrane, soon ruptures it and effects its escape. The body is at this time of an elongated form, terminating behind in a narrow, compressed tail. The integument is covered with vibrating cilia, which produce a constant current of fresh water over the surface of the body. Respiration is performed by gills, situated at the sides of the neck, which are at first exposed, but afterward become covered by a fold of integument. The muscular system is very feeble, and the young animal remains nearly motionless, attached by the mouth to the gelatinous matter around the eggs, upon which he feeds for several days. As he increases in size and becomes stronger, he abandons the spawn and swims about freely in the water, feeding upon the juices and tissues of aquatic vegetables. The cilia with which the body was covered disappear. The alimentary canal is at this time very long in proportion to the size of the whole body, being coiled up in the abdomen in a spiral form. During the summer lungs are developed in the interior, and the young tadpole frequently comes to the surface to take in air. But the

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gills also continue, and are still the most active organs of respiration. Toward the end of the season anterior and posterior extremities or limbs begin to grow; the posterior sprouting externally from each side, in the neighborhood of the anus; the anterior remaining concealed under the integument, just below the situation of the gills. The tadpole passes the winter in this transition state. The next spring the lungs increase in size, and the gills become less active as organs of respiration. The anterior extremities are liberated from their confinement by a rupture of the integument which covered them, and both anterior and posterior grow rapidly in size and strength. The tadpole at this time, therefore, has both fore and hind legs and a tail. The tail, early in the summer, becomes atrophied, and finally withers and disappears altogether; while the limbs, and especially the hind legs, grow to a disproportionate size. At the same time, the lungs attaining their full development, and the gills finally disappearing, the tadpole is thus converted into a perfect frog, capable of living and moving upon the land as well as in the water. The tadpole swims by the tail and breathes by gills, while the frog swims by the legs and breathes by lungs. Simultaneously with these changes, the alimentary canal becomes very much shorter in proportion to the rest of the body, and the frog becomes carnivorous in its habits, living principally upon insects, which he is enabled to capture by the great development of his muscular system, and the rapidity and suddenness of his movements.

—The process of development of the embryo consists, accordingly, in the successive formation and disappearance of different organs which are adapted to different modes of life. When these changes take place after the young embryo has left the egg, as in the case of the frog, and produce marked alterations in the external form of the body, they are termed transformations or metamorphoses. Thus the egg of the butterfly, when first hatched, produces a caterpillar, or larva—an animal with a worm-like body, sluggish crawling movements, and no sexual apparatus, but furnished with largely developed digestive organs and a voracious appetite. This condition is succeeded by the pupa state, in which the animal changes its skin, losing the legs and bristles which were its locomotory organs, and becomes motionless, nearly insensible to external impressions, and stops feeding altogether. During this period another integument grows underneath the old, with new legs and wings; and when the skin is again changed, the animal appears as a perfect insect, or imago, capable of rapid and sustained flight, ornamented with brilliant colors, provided with different sensory and digestive organs and a well developed sexual apparatus.—In those instances where the hatching of the egg is a longer process, similar changes to the above take place while the embryo is still retained in its interior. At the same time certain other organs are formed in addition, which either disappear before the time of hatching, or are thrown off when the young animal leaves the egg. With turtles, for example, the eggs, consisting of the vitellus, albumen, and shell, are deposited in an excavation in the earth or sand, and allowed to hatch in these situations. In birds, they are placed usually in nests, formed of twigs, leaves, and fibres, and there kept constantly warmed and protected by contact with the body of the female parent. This process is termed incubation, and may be imitated artificially by keeping the eggs at a temperatnre of 104° F. and providing for the regular supply of fresh air and a proper regulation of the atmospheric moisture. During incubation the eggs of the common fowl lose 12 per cent. of their weight, of which 11 per cent. is due to the exhalation of moisture. They also absorb oxygen and exhale carbonic acid. The segmentation of the vitellus and formation of the blastodermic membrane, and of the organs of the embryo, take place for the most part according to the plan already described, but variations present themselves which make the process more complicated. The vitellus, for example, instead of being entirely surrounded by the abdominal walls, is divided into two portions by a constriction situated about its middle. One of these portions remains outside the abdomen of the embryo, though still connected with it by a narrow neck, and by blood vessels which ramify upon its surface. This sac, containing a portion of the vitellus, is called the umbilical vesicle. It supplies the embryo with nourishment during the whole period of incubation; for immediately after the egg is laid the albumen, which is at first gelatinous in consistency, begins to liquefy near the upper surface, and the liquefied portions are immediately absorbed into the yolk. The yolk, therefore, grows larger and more fluid than before, while the albumen diminishes in quantity, and loses its watery portions. The blood vessels of the embryo, ramifying over the surface of the vitellus and the umbilical vesicle, in their turn absorb the nutritious fluids from it, and convey them into the interior of the body, to be used in the formation of the tissues. At the end of incubation the albumen has disappeared and the umbilical vesicle has much diminished in size, while the body of the chick has increased, at the expense of both; but the umbilical vesicle, containing the remains of the yolk, still exists, and is enclosed within the abdominal walls when the chick leaves the egg. In quadrupeds and the human species the umbilical vesicle is much smaller in proportion to the body, and less important in function, than in birds and the scaly reptiles. In the human embryo, the umbilical vesicle, always very small, disappears soon after the end of the third month of gestation. In the egg of the fowl, certain accessory membranes or envelopes begin to grow around the embryo at an early period. The first of these is the amnion, which is formed by a double fold of the blastodermic membrane, rising up about the edges of the body of the embryo, so as to surround it by a

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kind of circumvallation, or embankment. By continued growth these folds at last approach each other and meet over the back of the embryo, forming by their union and adhesion an enclosing membrane, or sac, which is the amnion. The amnion, therefore, is a membranous envelope, which is closed over the back of the embryo, but which remains open in front of the abdomen. About the same time a vascular, membranous diverticulum grows out from the alimentary canal, near its posterior extremity, and emerging from the open part of the abdomen turns upward over the back of the embryo, outside the amnion, and just inside the shell membranes. This vascular outgrowth is the allantois. It increases rapidly in size, growing upward and downward in every direction, until it finally envelopes completely the body of the embryo and the umbilical vesicle, taking the place of the albumen as it is gradually absorbed, and lining the whole interior of the egg shell with a continuous vascular membrane. The function of the allantois is principally to aërate the blood of the embryo, by bringing it into close contact with the porous egg shell, and thus allowing the absorption of oxygen and the exhalation of carbonic acid and watery vapor. Toward the latter period of incubation, the allantois becomes very closely adherent to the egg shell, and the shell itself grows thinner, more porous, and more fragile; whence it is believed that the allantois also serves to absorb calcareous matter from the shell, which it conveys into the interior of the body, to be used in the formation of the bones, the ossification of which takes place about this period. When the chick is sufficiently developed to leave the egg, usually at the end of the 21st day, by a sudden movement it strikes its bill through the end of the attenuated and brittle egg shell, and by inhaling the air and continuing its struggles, finally extricates itself from the cavity of the shell, leaving the allantois adherent to its internal surface. The bloodvessels of the allantois are torn off at the umbilicus, which afterward closes up, and unites by a permanent cicatrix.

—Another important change which takes place in the development of birds and quadrupeds, in addition to those presented by frogs and fishes, is in the formation of the urinary apparatus. In fishes and batrachians the urinary organs are two long glandular bodies situated on each side the spinal column, which are known as the Wolffian bodies, and which remain permanent throughout the life of the animal, no true kidneys ever being produced. But in birds and quadrupeds, the Wolffian bodies, which are at first very large and important organs, disappear during the progress of embryonic development, while the kidneys are formed at the same time, and gradually take their place as urinary organs. The kidneys are accordingly substituted for the Wolffian bodies in these instances, very much as lungs are substituted for gills in the development of the frog.—In many species of quadrupeds the allantois attains a large size, and performs a very important function, during extra-uterine life. In the ruminating animals, cows, sheep, goat, deer, &c., it forms an elongated sac, taking the form of the uterine cavity, and lying in close contact with the lining membrane of the uterus. The cavity of this sac communicates with the cavity of the posterior part of the intestine, from which it was originally developed, and receives the secretion of the Wolffian bodies, and afterward of the kidneys. Its exterior is covered with a large number (60 to 80) of tufted vascular prominences, which are entangled with similar elevations of the uterine mucous membrane, called cotyledons; and the blood of the embryo, while circulating through these bodies, absorbs from the maternal vessels the materials requisite for its nutrition. In the pig, the allantois is nearly smooth on its external surface, merely presenting transverse folds and ridges, which lie in contact with similar inequalities of the uterine mucous membrane. In the carnivorous animals its middle portion is shaggy and vascular, and entangled with the bloodvessels of the uterus, while its two extremities are smooth and unattached. In the human embryo, the amnion is formed in the same manner as already described; but the allantois, instead of constituting a hollow sac, with a cavity containing fluid and communicating with the intestine, spreads out into a continuous flattened membrane, the two layers of which are in contact with each other and adherent, leaving consequently no cavity between them. It extends, however, quite round the fœtus, enveloping it in a continuous vascular membrane, which here takes the name of the chorion. The chorion is, accordingly, the same thing in the human species as the allantois in the lower animals, except that its cavity is obliterated by the adhesion of its walls. It is covered uniformly, at an early date, with tufted villosities, which become entangled with the mucous membrane of the uterus. But during the 3d month it begins to grow smooth over the greater portion of its surface, while at a certain part the villous tufts grow more rapidly than before, until they are finally converted into a thick vascular, spongy, and velvety mass of villosities, which penetrate into the uterine mucous membrane, and become adherent to its bloodvessels. This organ is then termed the placenta; and from that time forward it serves the fœtus as an organ of absorption and nourishment, its bloodvessels imbibing from the circulation of the mother the albuminous fluids which it requires for growth and nutrition.—The amnion in the human species is at an early period so arranged that it closely invests the body of the embryo, while between it and the chorion there is interposed a thick layer of soft gelatinous material. During the 2d and 3d months the cavity of the amnion enlarges, by the accumulation of a watery and albuminous fluid (the amniotic fluid) in its interior, while the gelatinous matter between it and the chorion is gradually absorbed and disappears, in order to make way

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for its expansion. By this enlargement the amnion approaches nearer the internal surface of the chorion, and by the beginning of the 5th month the two membranes come in contact with each other. By this means the fœtus becomes enclosed in a large cavity (the amniotic cavity), filled with fluid, so that a free space is allowed for the movements of the fœtal limbs. These movements begin to be perceived about the 5th month, at which time quickening is said to take place. They afterward become more strongly pronounced, and before birth are frequently very active. These movements are also favored by the formation and growth of the umbilical cord. The blood vessels of the fœtus, termed the umbilical vessels, which pass out from the abdomen to the placenta and the chorion, become much elongated, and at the same time covered with a deposit of hard gelatinous matter, the whole being covered by a prolongation of the membrane of the amnion. This bundle of vessels, covered with the above investments, is termed the umbilical cord. It grows very long, and also becomes spirally twisted upon its own axis, usually in a direction from right to left. There are, in the latter periods of gestation, two umbilical arteries, carrying the blood of the fœtus outward to the placenta, and one umbilical vein, in which it is returned to the body and the internal venous system.—The formation of the blood and blood vessels in the embryo takes place at a very early period. Soon after the production of the blastodermic membrane, some of the cells of which it is composed break down, and liquefy in such a manner as to leave irregular spaces, or canals, which inosculate with each other by frequent communications. These canals are destined afterward to become the blood vessels, the structure of which is gradually perfected by the growth of fibrous tissue in their walls, and their complete separation from the neighboring parts. In the interior of these canals, or imperfectly formed blood vessels, there is to be seen at first only a transparent, colorless fluid, holding in suspension a few large, roundish, nucleated cells, which move sluggishly to and fro, as the current of the circulating fluid begins to be established. These cells do not differ much at this period from those which constitute the general mass of the neighboring tissues; but soon afterward they begin to be modified in their appearance, and converted into true blood globules. Their surface becomes smooth, and a reddish coloring matter is produced in their interior, which gives them a tinge similar to that of the red globules of the blood in the adult condition. The red blood globules of the fœtus, however, still differ in several important particulars from those of the adult. They are considerably larger and more globular in shape, and have also a very distinct nucleus, which is wanting in the blood globules of the adult, at least in the quadrupeds. They increase in numbers also, at this time, by spontaneous division, one globule becoming divided into two, which separate from each other and afterward become themselves divided in a similar manner. In this way the quantity of the blood globules is very rapidly increased, and they soon become also still further altered in form and structure. They diminish in size, become in the human subject and the quadruped flattened and biconcave in form, and finally the nucleus disappears. These changes are all effected during fœtal life, and for the most part during the early months, so that at the time of birth the blood globules have already the characteristics which distinguish them in adult life. The multiplication of the blood globules by subdivision is a process which takes place only in the embryo. The perfectly formed blood globules increase in number in some other way, probably by the isolated production and growth of new cells. —At the time of birth the fœtal membranes (amnion and chorion) are ruptured, and the fœtus escapes. The umbilical cord being at the same time divided and tied, the portion still connected with the fœtus soon shrivels and separates by spontaneous ulceration, while the spot at which it was attached heals in a few days, leaving a cicatrix on the middle of the abdomen, which is permanent throughout life, and which is called the umbilicus.—The limbs grow, by a kind of budding or sprouting process, from the sides of the body. They are at first mere rounded eminences, without distinction of parts or articulations; but they subsequently become successively divided into fingers and toes, and the different joints of the arm and leg. The upper extremities, during the greater part of fœtal life, are larger than the lower, but afterward the lower extremities and the pelvis grow faster than the arms and shoulders, and finally become after birth much the larger of the two. The lungs are small and solid in texture before birth, but immediately afterward they expand by the inhalation of air, and receive a much larger supply of blood than before. On the other hand, the liver is much larger in proportion to the rest of the body at an early period than subsequently. In some animals it amounts, during the first part of fœtal life, to 12 per cent. of the entire weight of the body, and is reduced to 3 or 4 per cent. at the time of birth. In the human subject it is equal at birth to 3½ per cent. of the entire weight, but is reduced in the adult to less than 3 per cent. Great changes take place also during fœtal life in the anatomy of the heart and circulatory system, as well as in the relative size and development of nearly all the organs in the body. These changes continue to take place after birth, though less rapidly than before, and the entire process of development is not regarded as complete until the individual has reached the adult condition.—A very singular modification of the above process of embryonic development among the mammalia occurs in the marsupial animals, of which the American opossum (*didelphis virginiana*) is a representative. In these animals the eggs are impregnated and the formation of the embryo commenced in the usual way; but after remain-

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ing for a comparatively short time in the uterus, and while their development is still very incomplete, the embryos are discharged from the generative passages, and are immediately afterward found attached by the mouth to the teats of the parent. They are then less than half an inch in length, and quite gelatinous and embryonic in appearance. They are protected by a double fold of the integument of the abdomen, which forms a kind of pouch, surrounding the teats, and serving to enclose the young and helpless embryos. They remain in this situation during the completion of their development, continuing attached for the most part to the teats, from which they derive nourishment; and even after they have become capable of running about by themselves, they still, upon an alarm, take refuge for a time in the pouch as before. It is not known how the young embryos, when expelled from the uterus, find their way into the external pouch, so as to reach the teats, for, notwithstanding many attempts have been made to ascertain this point, the animal is so secret in her habits at the time of delivery, that they have been thus far entirely unsuccessful.—Among invertebrate animals the egg is constituted, as a general thing, in nearly the same way as in vertebrata, and its impregnation takes place also in a similar manner. The segmentation of the yolk goes on by repeated subdivisions, until the whole vitellus is converted into a mulberry-shaped mass, out of which the embryo is formed. While, however, in the vertebrate animals, the embryo always lies with its belly upon the surface of the yolk, in some of the invertebrates, as the articulata (insects, spiders, crustaceans), the back of the embryo is in contact with the yolk, and the closing up or union of the two sides of the body takes place along the dorsal line, instead of the abdominal. In many mollusks, as for example in snails, the embryo, soon after the commencement of its formation, begins to rotate slowly in the interior of the vitelline sac; and this rotation continues more or less rapid until the hatching of the egg. In the invertebrate classes the metamorphoses or transformations of the young animal are more frequent and more striking than in vertebrata. In many of them the young animal, when first hatched from the egg, is entirely unlike its parent in structure, external appearance, and habits of life. In the class of insects many of these transformations are well known, and have always attracted the attention of the curious. Frequently the young animal, in passing through several successive transformations in which he is adapted to different modes of life, necessarily changes his habitation; and being found accordingly in totally different localities, and presenting at successive intervals corresponding differences of organization, the same embryo at different ages is often mistaken by the ignorant for an entirely distinct species of animal. These changes of habitation, occurring in the course of embryonic development, are termed migrations. They are often very marked in parasitic animals. Thus the tænia, or tapeworm, inhabiting the small intestines of certain animals, such as the dog, cat, &c., produces an egg containing a small globular embryo, armed with certain hard spikes, or curved prominences, capable of being moved by muscular fibres inserted into their base. The portion of the tapeworm in which these eggs are contained, known as the proglottis, is discharged from the intestine of the first animal, and the eggs, becoming mixed with vegetable matter, are devoured by animals belonging to other species, as for example the pig. Either in the process of mastication, or by the action of the digestive fluids of the stomach, the external envelope of the egg is destroyed, and the embryo set free. By means of its movable projecting spines, the embryo then makes its way through the walls of the stomach or intestine into the neighboring organs, and passing into the cavity of the blood vessels, is often transported by the current of the blood to distant regions of the body. Here, becoming arrested, it is temporarily fixed in place by the consolidation of the tissues round it, and becomes enlarged by the imbibition of fluid, assuming a vesicular form. A portion of this vesicle becomes inverted, and at the bottom of the inverted part a head is produced, upon which there are formed four muscular disks, or suckers, and a circle of calcareous spines or hooks, different from those present at an earlier period, which are thrown off and lost. In this state the animal receives the name of *scolex*, or *cysticercus*. It remains in that condition till the death of the animal whose tissues it inhabits, when being devoured with the flesh by an animal belonging to the first species, it passes into the intestine of the latter, and there becomes developed into the complete tapeworm, or *strobila*, similar to that from which its embryo was first produced. The same animal is accordingly a parasite in different organs, and even in different species, at different periods of its development. Some of the invertebrata are parasitic at one stage of their existence, and lead an independent life at another. Such are the small crustacea which infest the bodies and gills of certain fish. In the family of *œstridea*, or bot flies, the eggs are deposited by the female insect, and attached to the hairs of horses, cattle, &c.; from which situation, after the embryo has become partly developed, they are detached in some instances (as in *œstrus equi*) by licking, and swallowed into the stomach. Here the larva is set free, and attaches itself to the mucous membrane of the stomach, nourishing itself upon the fluids obtained from this source, and gradually increasing in size. After a certain period the larva lets go its hold, passes through the intestine, is discharged with the fæces, and assuming the pupa state, is finally transformed into the perfect insect. The process of embryonic development is accordingly a succession of changes, in which the structure and organization of the young animal are adapted to different modes of existence, and in which different organs and

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apparatuses, successively appearing and disappearing, replace each other in the progress of growth, and give rise to the appearance of transformations, which affect the body as a whole.—See Harvey, *Exercitationes Anatomicæ de Generatione Animalium* (London, 1651; Sydenham edition, London, 1847); Spallanzani, *Expériences pour servir à l'histoire de la génération* (Genève, 1786); Von Baer, *De Ovi Mammalium et Hominis Genesi Epistola* (Leipsic, 1827); Valentin, *Handbuch der Entwickelungsgeschichte des Menschen* (Berlin, 1835); Coste, *Recherches sur la génération des mammifères* (Paris, 1834); *Embryogénie comparée* (Paris, 1837); *Histoire générale et particulière du développement des corps organisés* (Paris, 1847, '49, '53); Pouchet, *Théorie positive de la fécondation des mammifères* (Paris, 1842); *Théorie positive de l'ovulation spontanée et de la fécondation des mammifères et de l'espèce humaine* (Paris, 1847); Bischoff, *Traité du développement de l'homme et des mammifères, sur la maturation et la chute périodique* (Paris, 1843); *De l'œuf de l'homme et des mammifères, indépendamment de la fécondation* (*Annales des sciences naturelles*, Aug. 1844); *Entwickelungsgeschichte des Meerschweinchens* (Giessen, 1852); Rathke, *Ueber die Entwickelung der Schildkröten* (Brunswick, 1848); H. Baudrimont and Martin St. Ange, *Du développement du fœtus* (Paris, 1850); Bergmann and Lenckart, *Vergleichende Anatomie und Physiologie* (Stuttgart, 1852); Agassiz, "Lectures on Comparative Embryology" (Boston, 1849).

EMBURY, Emma Catharine, an American authoress, born in New York. She is the daughter of Dr. James R. Manley of that city, and was married to Mr. Daniel Embury in 1828. In the same year she published "Guido and other Poems." Since her marriage she has written more prose than verse, and her tales, like her poems, have been originally published in the columns of the periodical press. Of these some have appeared in a collected form, under the titles of "The Blind Girl and other Tales," "Glimpses of Home Life," and "Pictures of Early Life." In 1845 she supplied the letter-press, both prose and verse, to an illustrated gift book entitled "Nature's Gems, or American Wild Flowers," and in the succeeding year published a collection of poems called "Love's Token Flowers." Her last work is "The Waldorf Family, or Grandfather's Legends" (1848), a fairy tale of Brittany, partly a translation and partly original.

EMDEN, or Embden, a seaport town of Hanover, in the province of Aurich (the former principality of East Friesland), situated a little below the outfall of the river Ems into the Dollart estuary; pop. 13,000. The harbor is shallow, but the roadstead is capable of accommodating large vessels. Canals intersect the town in various directions; one connects it with the town of Aurich, and another (opened since 1846, at a cost of $230,000) with the river Ems. Another canal is now in course of construction to connect the town with the deep waters of the Dollart. It is also to be protected by a high and strong embankment against the incursions of this estuary, from which it has frequently suffered. Although the town has declined in population and prosperity, it continues to be a commercial place of considerable importance. About 400 vessels enter and leave the port annually, and ship-building is extensively carried on. Emden is of very ancient origin, and resembles more a Dutch than a German town. In the present century it has passed through the hands of Prussia, Holland, and France, and came to Hanover in 1815.

EMERALD (Sp. *esmeralda;* Gr. σμαραγδος, to shine), a name given to the finest crystals of the mineral species beryl, transparent and of rich green colors derived from oxide of chrome, which is present in the proportion of less than one per cent. (See Beryl for description of the species.) It is found in metamorphic rocks, the granites, hornblende rocks, dolomites, &c. The finest known come from the vicinity of Bogota, the capital of New Granada, in South America, where they are said to be found in veins in a black limestone. It is from this region that the celebrated crystal in the cabinet of the duke of Devonshire is said to have been obtained. The Peruvian emeralds were famous from the time of the conquest of that country by Pizarro. They were obtained in the barren district of Atacama, and worked by the native artists with the skill of the modern lapidary. To this day a river and a village of Ecuador are known by the name of Esmeraldas from the abundance of emeralds formerly found in that region. Mexico, at the same early period, had produced crystals of rare beauty, which were no less appreciated and highly valued by the rulers of the Aztecs than were those of Peru by its incas. When Cortes on his return to Europe preferred, in the disposal of 5 of these magnificent jewels, his youthful bride to the queen of Charles V., a feeling of estrangement is thought to have been produced in the royal bosom, which had an unfavorable influence on the future fortunes of the conqueror. For one of these precious stones some Genoese merchants are said to have offered Cortes 40,000 ducats. They had been cut by the exquisite workmanship of the Aztecs, one in the form of a rose; the second in the form of a horn; the third like a fish, with eyes of gold; the fourth was like a little bell, with a fine pearl for the tongue. The fifth, which was the most valuable, was a small cup with a foot of gold, and with 4 little chains of the same metal attached to a large pearl as a button. From these sources were probably obtained the magnificent emeralds now in the royal collection at Madrid, some of which are stated to be as large as those of the duke of Devonshire, and of the finest water. The emerald has long been highly esteemed, ranking in value next to the diamond and the ruby. Pliny states that in his time those of considerable size, which were free from defects, were sold at enor-

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mous prices. The color of the emerald is a peculiar shade of green, different from that of any other precious stone, and is called by the name of emerald green. It has different shades, some of verdigris or grass green, and some of a paler hue. They all appear best by daylight, and to retain their effect by candle light they require to be set with small diamonds or pearls. Emeralds are generally cut in the form of a square table, with bevelled edges, the lower surface being cut into facets, parallel to their sides. Beudant, in his *Minéralogie*, gives the value of emeralds of fine colors, and free from flaws, as follows: one of 4 grains, 100 to 120 francs; of 8 grains, 240 francs; of 15 grains, as high as 1,500 francs; and he cites a fine stone of 24 grains which was sold at 2,400 francs.

EMERSON, George Barrell, an American educator, born in Kennebunk, York co., Maine, Sept. 12, 1797. He was graduated at Harvard college in 1817, and soon after took charge of an academy in Lancaster, Mass., having for some years previously employed portions of his college terms and vacations in teaching district schools in Maine and Massachusetts. Between 1819 and 1821 he was the tutor in mathematics and natural philosophy in Harvard college, and in 1821 was chosen principal of the English high school for boys then recently established in Boston. In 1823 he opened a private school for girls in the same city, which he conducted until 1855, when he retired from professional life. He wrote the 2d part of the "School and Schoolmaster," of which the 1st part was written by Bishop Potter of Pennsylvania, and which was distribnted by private munificence among the school districts of Massachnsetts and New York; and is the anthor of a number of lectnres on education, and of articles contributed to the periodical press. He was for many years president of the Boston society of natural history, and was appointed by Gov. Everett chairman of the commissioners for the zoological and botanical survey of Massachnsetts, in which capacity he published a "Report of the Trees and Shrubs growing naturally in the Forests of Massachusetts" (Boston, 1846).

EMERSON, Ralph Waldo, an American poet and essayist, born in Boston, May 25, 1803. He is the son of the Rev. William Emerson, pastor of the 1st church in that city; in his 8th year, on the death of his father, he was sent to one of the public grammar schools, and was soon qualified to enter the Latin school. Here his first attempts in literary composition were made, consisting not merely of the ordinary exercises by which boys are drearily inducted into the mysteries of rhetoric, bnt of original poems recited at exhibitions of the school. In 1817 he entered Harvard college, and was graduated in August, 1821. He does not appear to have held a high rank in his class, though the records show that he twice received a Bowdoin prize for dissertations, and once a Boylston prize for declamation. He was also the poet of his class on "class day." While at the university he made more use of the library than is common among students, and when graduated was distinguished among his classmates for his knowledge of general literature. For 5 years after leaving college he was engaged in teaching school. In 1826 he was "approbated to preach" by the Middlesex association of ministers, but his health at this time failing, he spent the winter in South Carolina and Florida. In March, 1829, he was ordained as colleague of Henry Ware, at the 2d Unitarian church of Boston. He belongs to a clerical race. For 8 generations, reckoning back to his ancestor Peter Bulkley, one of the founders of Concord, Mass., there had always been a clergyman in the family, either on the paternal or maternal side. He was the 8th, in orderly succession, of this consecutive line of ministers. In Sept. 1830, he was married to Ellen Louisa Tucker of Boston, who died in Feb. 1831. In 1832 he asked and received a dismission from the 2d church, on account of differences of opinion between himself and the church, touching the Lord's supper. From this period we may date that impatience with fixed forms of belief, and that instinctive suspicion of every thing having the faintest appearance of limiting his intellectual freedom, which were afterward so conspicuous in his writings, and which have sometimes been carried so far as to give a dash of wilfulness and eccentricity to his most austerely honest thinking. In Dec. 1832, he sailed for Europe, where he remained nearly a year. On his return in the winter of 1833–'4 he began that career as a lecturer, in which he has since gained so much distinction, with a discourse before the Boston mechanics' institnte, on the somewhat unpromising subject of "Water." Three others followed, two on Italy, descriptive of his recent tour in that country, and the last on the "Relation of Man to the Globe." In 1834 he delivered in Boston a series of biographical lectures on Michel Angelo, Milton, Luther, George Fox, and Edmnnd Burke, the first two of which were afterward published in the "North American Review." In this year also he read at Cambridge a poem before the Phi Beta Kappa society. In 1835 he fixed his residence at Concord, Mass., where he has since lived. In Sept. 1835, he married Lidian Jackson, daughter of Charles Jackson of Plymouth. During the winter he delivered in Boston a course of 10 lectures on English literature. These were followed, in 1836, by 12 lectures on the philosophy of history; in 1837, by 10 lectures on human culture; in 1838, by 10 lectures on human life; in 1839, by 10 lectures on the present age; in 1841, by 7 lectnres on the times; and since that period he has delivered in Boston 5 or 6 courses of lectures, which are still among his unpnblished writings. Of his printed works, a small volume entitled "Nature" (published in 1836), an oration before the Phi Beta Kappa society, with the general title of the "American Scholar" (1837), an address to the senior class of the Cambridge divinity school (1838), and the "Method of

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Nature" (1841), contained the most prominent peculiarities of his scheme of idealism, and by their freshness and depth of thought and compact beauty of expression, allured many readers into disciples. In 1840 the school of New England transcendentalists was sufficiently large to demand an organ; and a quarterly periodical, called the "Dial," was started, with Miss Margaret Fuller as editor, assisted by A. B. Alcott, William H. Channing, Mr. Emerson, Theodore Parker, George Ripley, and others. It was published for 4 years, and during the last 2 years of its existence it was under the editorship of Mr. Emerson. In 1841 the first series of his "Essays" was published. The author might prondly say of these, as Bacon said of his own, "that their matter could not be found in books." It is probable that they would have been at once widely welcomed as a positive addition to literature, had it not been for some startling paradoxes and audacious statements, which, while they were in direct conflict with the theological beliefs of the people, were supported neither by facts nor arguments, but rested on the simple testimony of the author's individual consciousness. In 1844 a second series of essays was published, evincing, as compared with the first, equal brevity and beauty of expression. In 1846 he collected and published his poems. The next year he visited England for the purpose of fulfilling an engagement to deliver a series of lectures before a union of mechanics' institutes and other societies. In 1849 he collected in one volume his "Nature" and 9 lectures and college addresses, which had been previously issued in pamphlet form, or printed in the "Dial." In 1850, "Representative Men," a series of masterly mental portraits, with some of the features overcharged, was published. To the "Memoirs of Margaret Fuller Ossoli," which appeared in 1852, he contributed some admirable interpretative criticism. In 1856 he published "English Traits," a work in which he seizes and emphasizes the characteristics of the English mind and people. Mr. Emerson has also delivered many unpublished addresses on slavery, woman's rights, and other topics of public interest; and he has been one of the most prominent of the lecturers who address the lyceums of the country.—As a writer, Mr. Emerson is distinguished for a singular union of poetic imagination with practical acuteness. His vision takes a wide sweep in the realms of the ideal; but is no less firm and penetrating in the sphere of facts. His observations on society, on manners, on character, on institutions, are stamped with rare sagacity, indicating a familiar knowledge of the homely phases of life, which are seldom viewed in their poetical relations. One side of his wisdom is worldly wisdom. The brilliant transcendentalist is evidently a man not easy to be deceived in matters pertaining to the ordinary course of human affairs. His common sense shrewdness is vivified by a pervasive wit. With him, however, wit is not an end, but a means, and usually employed for the detection of pretence and impostures. Mr. Emerson's practical understanding is sometimes underrated from the fact that he never groups his thoughts by the methods of logic. He gives few reasons, even when he is most reasonable. He does not prove, but announces, aiming directly at the intelligence of his readers, without striving to extract a reluctant assent by force of argument. Insight, not reasoning, is his process. The bent of his mind is to ideal laws, which are perceived by the intuitive faculty, and are beyond the province of dialectics. Equally conspicuous is his tendency to embody ideas in the forms of imagination. No spiritual abstraction is so evanescent but he thus transforms it into a concrete reality. He seldom indulges in the expression of sentiment, and in his nature emotion seems to be less the product of the heart than of the brain. Mr. Emerson's style is in the nicest harmony with the character of his thought. It is condensed almost to abruptness. Occasionally he purchases compression at the expense of clearness, and his merits as a writer consist rather in the choice of words than in the connection of sentences, though his diction is vitalized by the presence of a powerful creative element. His thought dictates his word, stamps it with its own peculiar quality, and converts it from a fleeting sound into a solid fact. The singular beauty and intense life and significance of his language demonstrate that he has not only something to say, but knows exactly how to say it. Fluency, however, is out of the question in a style which combines such austere economy of words with the determination to load every word with vital meaning. But the great characteristic of Mr. Emerson's intellect is the perception and sentiment of beauty. So strong is this, that he accepts nothing in life that is morbid, uncomely, haggard, or ghastly. The fact that an opinion depresses, instead of invigorating, is with him a sufficient reason for its rejection. His observation, his wit, his reason, his imagination, his style, all obey the controlling sense of beauty, which is at the heart of his nature, and instinctively avoid the ugly and the base. Those portions of Mr. Emerson's writings which relate to philosophy and religion may be considered as fragmentary contributions to the "Philosophy of the Infinite." He has no system, and indeed system in his mind is associated with charlatanism. His largest generalization is "Existence." On this inscrutable theme, his conceptions vary with his moods and experience. Sometimes it seems to be man who parts with his personality in being united to God; sometimes it seems to be God who is impersonal, and who comes to personality only in man; and the real obscurity or vacillation of his metaphysical ideas is increased by the vivid and positive concrete forms in which they are successively clothed. Generally, the divine Being is felt or conceived as a life-imparting influence divinizing nature and man, and as identical with both. He adores the Spirit of God rather than God, the

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rays of the sun rather than the sun, and does not appear to give sufficient prominence to the obvious principle that the individuality of the Divine Nature, being an infinite individuality, may include infinite expansiveness and infinite variety of working in infinite self-consciousness; and that the appearance of impersonality comes from the conception of personality under finite human limitations.

EMERY, a mineral substance usually described as a variety of corundum, but really a mechanical mixture of this mineral with oxide of iron, so intimately associated that the smallest fragment commonly exhibits the two together. In some instances, when separated into different portions by washing with oil, fine crystals of corundum have been detected by the microscope. Its extreme hardness, derived from the corundum, and the ease with which it is obtained in large quantities, have led to its extensive use in the arts, for grinding and polishing hard stones, metals, and glass. The localities from which it is obtained in the Grecian archipelago, and in the vicinity of Smyrna and Ephesus in Asia Minor, were probably some of them known to the ancient Greeks and Romans, as the use of a substance of this nature seems to have been required by the lapidaries of Magnesia, Ephesus, Tralles, and Tyre. In later times the island of Naxos in the archipelago has furnished all the supplies of commerce, the mineral being shipped from the port of Smyrna, and known by the name of Smyrna emery. From 1835 to 1846 the trade in emery was a monopoly granted by the Greek government to an English merchant, who so regulated the supply as to raise the price from its former rate of $40 a ton to about $140. This monopoly was broken up and the whole trade changed in consequence of the discoveries of Dr. J. Lawrence Smith of the United States, who in the course of his explorations in the service of the Porte discovered in 1847 a number of localities of the mineral belonging both to the Turkish and Greek governments. By an arrangement with the former, operations were commenced in the same year at some of the localities and afterward extended to others, so that the price has since been reduced to $50 per ton. At the mountain of Gumuch-dagh, 12 m. E. of the ruins of Ephesus, Dr. Smith found the emery upon the summit scattered about in loose pieces of all sizes, up to masses of several tons weight. The rock to which it belonged was a bluish metamorphic marble, reposing upon mica slate and gneiss. In this rock the mineral was found in nodules, and in amorphous masses, some of which were several yards in length and breadth, and of the weight of 30 to 40 tons. The structure of this rock is compact and tolerably regular, but the surface presents a granular appearance. Unless traversed by fissures, the rock is broken with great difficulty, and attempts to drill it are made in vain from its wear upon the tools. As the transportation from the quarries is only on the backs of camels or horses, many of the heavier masses are necessarily left behind. Some of the blocks, however, yield to the hammers after being exposed for some hours to the action of fire. The color of the powder varies from dark gray to black; but its shade has no relation to its hardness, and is consequently no index of the value of the article. The relative degrees of hardness of different samples were determined by Dr. Smith by collecting the powder just coarse enough to pass through a sieve of 400 holes to the inch, and with weighed samples of this rubbing little test plates of glass till they ceased to be further reduced. The rubber was the smooth bottom surface of an agate mortar. The loss in weight experienced by the glass plates gave the relative values of the samples of emery. On this plan Dr. Smith prepared a table exhibiting the different degrees of hardness; and making use of sapphire of Ceylon as the standard of comparison, the hardness of which he called 100, and the effective wear of which upon glass was equal to about ¼ of its own weight, that of the best emery was about ⅓ of its weight. This table, to which were appended the results of the analyses of many samples of the mineral made by Dr. Smith, was published in the elaborate articles he furnished to the "American Journal of Science," 2d series, vols. x. and xi. The hardness of the sapphire as rated upon the mineralogical scale is 9, next to the diamond, which is 10. That of emery is not necessarily indicated by the proportion of alumina, for a part of this may be in combination with the silica. It seems to vary with the water present, those samples containing the least water being the hardest.—In 1855 the annual production of emery was 2,000 tons of Naxos stone and 1,600 tons of Turkish. The whole business was concentrated in the hands of Mr. Abbott, who held the contract with the Greek government extending for 10 years, and had purchased the Turkish firman unlimited in time for the annual payment of $55,000. An arrangement was entered into with the house of Messrs. John Taylor and sons of England to employ a capital of £120,000 in this business, and supply the emery either in the stone or powder to all parts of the world, with the guarantee of its being free from adulterations, such as had previously impaired its qualities and reduced its value. The principal consumption of the article is in polishing plate glass, and the increase of this business causes a constantly increasing demand for emery. The discovery of new localities is a matter of great importance, the few that are known in other parts of the world furnishing no supply capable of competing with that brought from the head of the Mediterranean. It is said to be found near Petschkau in Bohemia, near Ekaterinburg in the Ural, near Miask in the Ilmen mountains, and in Frederic valley, Australia.—Emery is prepared for use by crushing the stone under stamps, and sorting the powder into different sizes by appropriate sieves. For the most delicate uses of opticians, &c., it is separated in

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a small way by a system of washing over called by chemists elutriation. After being ground, the powder is thrown into water, or water containing gum arabic, or it may be oil, and allowed to subside for a certain number of seconds or minutes. The process being systematically conducted, the powder is sorted into many sizes, and named according to the time the fluid was allowed to stand before the substance in suspension was collected, as emery of 10 seconds, of 30 seconds, 2 minutes, 30, 60, 80 minutes, &c. Emery is applied to paper, thin cloth, and slips of wood, by dusting the powder upon these articles, which are first coated with thin glue. They are then ready for sale or for use under the name of emery paper, cloth, or sticks. Mixed with paper pulp and fine glass and rolled into sheets, it forms the patent razor-strop paper; and by a variety of other methods it is prepared for its most convenient application to its numerous uses of grinding and polishing.

EMETICS, medicines used to produce vomiting. They may be divided into two classes, specific and irritant. The first class require for their operation that they be taken into the circulation, and they produce their specific effects whether they are absorbed from the stomach or injected directly into the blood. When taken internally their action does not commonly commence until after 20 or 30 minutes; then nausea, chilliness, and a feeling of weakness are produced, while the pulse is slow and soft; and as vomiting is induced, these give way to a flushed countenance, a warm skin, and a full pulse. Irritant emetics, as sulphate of zinc, copper, mustard, &c., on the other hand, produce vomiting by their direct effect upon the lining membrane of the stomach. Their action is immediate and unpreceded by any nausea or other precursory symptoms. They are used chiefly in cases of narcotic poisoning, and in cases of accumulation in the bronchial tubes, where from the feebleness of the patient it is desirable to shun the depression preceding the action of ordinary emetics, while full and prompt vomiting is required.

EMIGRATION, the act of leaving the country or place where one has previously resided, in order to reside elsewhere. In all European countries, Great Britain excepted, a formal relinquishment of the rights and duties of citizenship by the emigrant and the government respectively is required in order to render emigration legal. If no "certificate of expatriation" is obtained by the emigrant, his former government retains its claims on him, whether he becomes a naturalized citizen of another country or not. But even those emigrants who have been legally dismissed from the country of their birth are, in many European states, regarded as remaining under certain moral obligations toward their former government. They may be treated as traitors if they carry arms against their native state; it is also customary not to receive them as representatives of the foreign country to which they may emigrate. Thus the English government refused to receive Count Rumford as the minister of Bavaria, he having been born a subject of the British crown. Formerly the principle that no subject could ever cease to owe allegiance to his government prevailed in Europe, and the statute books of England still contain laws forbidding the emigration of several classes of artisans; but they have become obsolete. The general rule in European countries is now to allow emigration, provided the emigrant has fulfilled all his obligations toward his native state; yet the question is still surrounded with many difficulties. The United States, by adopting foreigners as citizens without requiring a certificate of their dismissal from their original citizenship, have implicitly proclaimed the natural right of expatriation, that is to say, the right of every man to choose a government under which he intends to live. To this extent the right has not been acknowledged by any European state except Great Britain, and by the latter only practically, not legally. Cases have frequently arisen in which naturalized citizens of the United States, even those who came here as minors by the will of their parents, have been compelled, on travelling through the country of their birth, to do military duty, or have been punished for having failed to do so. The policy of the government of the United States in regard to such cases has been as unsettled as that of Great Britain. While, in 1853, Mr. Marcy, then secretary of state, in his famous Koszta letter, demonstrated the right and duty of the United States to protect even "inchoate citizens" against exactions arising from their former political relations, in 1858 the representative of the United States at Berlin was not sustained by his government in protesting against the forcible enrollment of naturalized American citizens in the Prussian army. It was held then, that when a foreigner became naturalized in the United States without having obtained permission to do so from his former government, he was entitled to the protection of the American government only within the territory of the United States, and, when returning to his native country under cover of an American passport, did so at his own risk. A distinct legal definition of the bearing of the act of naturalization upon the rights of the naturalized citizen in regard to his former government has never been attempted.—In some cases governments have been glad to lose a portion of their population, especially where the Malthusian theory of over-population prevails. Thus, British economists congratulated their country upon the great migration from Ireland to America about the middle of this century. Their theory was that by thus thinning out the population, the means of subsistence for those remaining must necessarily be increased. Possibly the peculiar political institutions of a country may authorize such a belief, but general experience tends to prove that an absolute over-population is ont of the question even in the most densely settled European

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countries. A relative over-population, caused by partial and insufficient development of natural resources, exists in the most thinly settled countries. Indeed, the lower the state of civilization the more frequent is a relative over-population. This is proved by the example of the American Indians, a few thousands of whom may starve for want of food on a territory large enough for a European kingdom. The limit of absolute over-population, that is, of the insufficiency of the natural resources to subsist a people, may have been reached in some provinces of China, but has not yet been pointed out by actual experience in Europe. It is a significant fact that the emigration from some European countries, Rhenish Prussia and Westphalia for instance, is in an inverse ratio to population; that is to say, the largest number emigrate from the most thinly settled agricultural districts, these having, relatively, a larger over-population than those in which agricultural and manufacturing pursuits are combined. The monarchical governments of Europe have from time to time endeavored to diminish emigration by oppressive laws, and by levying heavy taxes upon emigrants; but of late they have begun to perceive that such measures fail entirely to produce the desired result, and have therefore confined their efforts to the regulation and protection of emigration. Associations have been formed in many European states for this special purpose. In the United States there are likewise a number of similar associations devoting themselves to the assistance of immigrants. The United States government has passed laws for the regulation of emigrant ships (March 2, 1819; Feb. 22, 1847; May 17, 1848; March 3, 1849, &c.). The state of New York has established a board of commissioners which requires a tax of $2 from every immigrant, and applies the proceeds of this taxation to the support of the needy and destitute among them. A depot for all immigrants arriving at New York, designed to protect them against fraud and violence, was opened in 1855. Similar measures have been adopted or proposed in the states of Wisconsin, Illinois, and Michigan, the latter of which in 1859 appointed agents for the purpose of drawing a portion of the emigration from Europe to the state of Michigan. In 1858 the German diet proposed certain rules for the restriction of emigration from Germany to America, but their adoption was retarded by the war beginning in April, 1859.—The history of emigration in the broadest meaning of the word is, in fact, the history of mankind. Of the earliest migrations by which the fundamental features of European history have been defined, no records remain, but numerous traces of them are found by the archæologist, ethnologist, and linguist. In the earliest stages of civilized life, when hunting was man's only means of subsistence, his wild roamings over large territories could scarcely be called emigration, since there were no settled habitations to leave or to go to. Emigration proper commenced when herdsmen congregated into nomadic tribes. Of such corporate emigration patriarchal history records some examples, as those of Lot, Abraham, and Jacob. With the progress of agriculture and the growth of more definite political relations, trade, and commerce, began the emigration of single bodies of adventurers to distant countries. In this way Phœnicians, led by Cadmus, and Egyptians, led by Danaus and Cecrops, emigrated to Greece, the Heraclidæ from Greece to Asia Minor, the Tyrrhenians to Italy. Unlike these, the exodus of the Israelites from Egypt to Canaan was a corporate emigration of a people, on account of religious and political oppression, for which modern history furnishes parallels in the Mormon emigration to Utah and the emigration of the Boers in southern Africa. During the historical times of ancient Greece emigration generally assumed the character of colonization. Many flourishing and powerful colonies were thus sent forth along the shores of the Mediterranean and Black seas by Greece, the relative position of which in ancient history is similar in that respect to that of the Germanic (Anglo-Saxon) nations as contrasted to that of the Roman race. The colonies of ancient Rome for the most part were rather outposts of an army and combinations of fortune hunters than settlements of men intending to found permanent residences. The great migration of the Germanic nations having destroyed the Roman empire, the movements of European society were for centuries not unlike the whirlpool caused by the sinking of a large vessel. Nations and races were tossed hither and thither, and only a few out-of-the-way nooks and corners of Europe remained undisturbed. Charlemagne changed the direction of German emigration from the south to the east and north. While from that time the movements of German nations toward Italy assumed the character of mere military conquests, their emigration conquered nearly the whole country between the Elbe and Vistula rivers from the Slavic race. A counter current from Asia, which set in at various periods of the middle ages, consisting of Magyars and Tartars, was successfully resisted, and the tide was even turned upon Asia by the crusades; but at a later period another Asiatic race, the Osmanli (Turks), succeeded in displacing the most decayed of Christian nations in south-eastern Europe, while almost simultaneously still another Asiatic race (the Arabs) was expelled from the south-western peninsula (Spain), to which they had emigrated 8 centuries before.—Individual emigration, as distinguished from the movements of whole nations, commenced on a large scale after the discovery of America. During the 16th century the nations in which the Roman element predominated, Spain, Portugal, and France, sent forth a great number of emigrants, most of them mere adventurers who did not intend to stay longer than might be necessary to become rich. The first attempts by the English to organize emigration to America likewise originated in adventurous designs. In such attempts

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300 men and £40,000 were lost from 1585 to 1590. In 1606 over 2,000 emigrants were sent from England to North America to seek for gold, but they perished miserably, and in 1609 but 60 of them remained. The Hakluyt company for the colonization of Virginia lost 9,000 men and £100,000. At last religious contests laid a firm foundation for the permanent settlement of the North American continent. The emigration of the Puritans and their successful establishment in New England served as an example to all those who in Europe were oppressed for the sake of their religion. Beside, the ground having been broken for the settlement of what are now the southern states of the Union, the fertility of their soil, their genial climate, and withal the still lingering hope of sudden enrichment by discoveries of precious metals, attracted large numbers of colonists. A strong tide of emigration from Germany set in toward Pennsylvania near the end of the 17th and during the 18th century; the Dutch colonized New York; the Swedes Delaware; Canada and Louisiana were settled by French adventurers. Still the current of emigration to America during the 170 years of the colonial history was slow and tedious when compared with that which commenced after the war of independence, and especially when the success of American institutions had been tested by the experience of one generation. Statistical tables of the number of alien immigrants were not kept until, in compliance with an act of congress of March 2, 1819, collectors of the customs began to report quarterly to the secretary of state the number, sex, age, &c., of passengers arriving by sea. There are, however, reasons to doubt the accuracy of the reports made within the first 10 or 15 years succeeding the passage of the act. Mr. F. Kapp attempts to prove from the records of several settlements, established between 1820 and 1830, that the number of immigrants who arrived during that time was larger than that given in the official reports. The immigration from 1784 to 1794 is stated by Mr. Samuel Blodget (1806) to have averaged 4,000 per annum. During 1794, 10,000 immigrants were estimated to have arrived in the United States, but this was an extraordinary number for the time. The yearly average of the immigration during 20 years, from 1790 to 1810, is assumed by Dr. Adam Seybert to have been 6,000. During the 10 years from 1806 to 1816 extensive emigration to the United States was precluded by the unfriendly relations at that time existing between Great Britain, France, and the United States; but soon after the restoration of peace it began again. During the year 1817 over 20,000 immigrants arrived. No trustworthy data exist on the immigration of the 21 months from Jan. 1, 1818, to Sept. 30, 1819. From the latter date to 1855, the number of alien passengers, and from 1856 to 1858 the total number of passengers (natives of the United States included) arriving by sea, are officially reported as follows:

Periods.	Males.	Females.	Sex not stated.	Total.
Year ending				
Sept. 30, 1820	4,671	2,398	1,121	8,385
" 1821	4,651	1,636	2,840	9,127
" 1822	3,816	1,018	2,082	6,911
" 1823	3,598	848	1,908	6,354
" 1824	4,706	1,393	1,814	7,913
" 1825	6,917	2,959	323	10,199
" 1826	7,702	3,078	57	10,837
" 1827	11,868	5,939	1,153	18,875
" 1828	17,261	10,060	61	27,382
" 1829	11,908	5,112	6,105	22,580
" 1830	6,439	3,155	13,748	23,892
" 1831	14,999	7,724	....	22,623
" 1832	84,596	18,588	....	53,179
Fifteen months ending				
Dec. 31, 1833	46,237	19,606	100	65,943
Year ending				
Dec. 31, 1834	38,796	22,540	4,029	65,365
" 1835	28,196	17,027	151	45,374
" 1836	47,865	27,558	824	76,248
" 1837	48,827	27,636	2,850	79,340
" 1838	33,474	18,685	1,755	53,914
" 1839	42,982	23,125	12	66,069
" 1840	52,853	31,132	51	84,056
" 1841	48,082	32,091	176	80,249
" 1842	62,377	41,907	331	104,565
First 3 quarters of 1843	30,069	22,424	3	52,496
Year ending				
Sept. 30, 1844	44,431	34,184	....	78,615
" 1845	65,015	48,115	1,241	114,371
" 1846	87,777	65,742	897	154,416
" 1847	184,686	97,917	965	234,968
" 1848	133,906	99,149	472	226,527
" 1849	177,232	119,980	512	297,024
" 1850	196,381	118,655	1,088	316,004
Fifteen months ending				
Dec. 31, 1851	250,171	189,024	247	439,442
Year ending				
Dec. 31, 1852	212,469	157,696	1,438	371,606
" 1853	297,958	160,615	72	388,645
" 1854	256,177	171,756	....	427,933
" 1855	115,307	85,567	3	200,877
" 1856	135,203	89,193	....	224,396
" 1857	162,536	109,020	....	271,556
" 1858	89,648	54,704	280	144,632

The total number of alien immigrants who arrived in the United States from Sept. 30, 1819, to Dec. 31, 1855, is 4,212,624. Of the passengers coming by sea during the 3 years ending Dec. 1858, deducting therefrom those born in the United States, as also those who merely passed through the United States to the British provinces, &c., there remain about 550,000 souls. Estimating the number of immigrants who arrived from 1784 to 1819 at 150,000, we obtain a grand total of 4,912,624, or, in round numbers, 5,000,000 immigrants into the United States from 1784 to Jan. 1, 1859. Of this number about 2,600,000 came from Great Britain and Ireland; about 1,600,000 from Germany (including the whole of Prussia and Austria); 200,000 from France; 100,000 from British America; 50,000 from Sweden and Norway; 50,000 (?) from China; 40,000 from Switzerland; 36,000 from the West Indies; 18,000 from Holland; 16,000 from Mexico; 8,000 from Italy; 7,000 from Belgium; 5,500 from South America; 2,000 from Portugal; 1,300 from the Azores; 1,000 from Russia. It will be seen from the above table that the emigration to the United States increased in an unprecedented proportion from 1845 to 1854. This was owing in the first instance to the great famine in Ireland; in the second, to the revolutions of 1848, by which great numbers of those whose prospects had been blighted by political convul-

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sions were induced to remove to the western continent. The year 1854 was also the turning point in the numerical proportion of the emigration from Ireland and Germany. In 1852 Ireland sent 160,000 emigrants to the United States, Germany but 145,918; in 1853 there arrived 164,000 emigrants from Ireland, and 141,946 from Germany; but in 1854 the Irish immigration fell to about 103,000, while the German increased to 215,009, and in 1855 there arrived 71,918 Germans (including Prussians and Austrians), and 50,000 Irishmen. In the port of New York there arrived in 1856, 56,117 German, and 43,996 Irish immigrants; in 1857, 86,859 German, and 57,106 Irish; in 1858, 31,874 German, and 25,097 Irish. From Jan. 1 to April 7, 1859, there arrived in the port of New York 7,193 immigrants, against 8,018 during the same period in 1858. The steady falling off of the immigration since 1854 is attributed to various causes, prominent among which are the strong reaction of the native American sentiment against the supposed deluge of the United States by aliens, and the financial crises of 1854–'7. It has been calculated that the number of 2,500,000 foreigners who had settled in the United States from 1784 to 1850 had during that period been swelled to 4,000,000 including their descendants. Assuming this to be correct, in 1860 the total of that portion of the population of the United States which is the product of immigration since 1784 would be near 7,000,000. But a close calculation is rendered exceedingly difficult by the fact that the proportion of age in an immigrant population is very different from that in a native one, there being always among the former a greater number of marriageable persons, but also a greater proportion nearer to the average period of human life. Of the total emigration from Europe, the largest portion is identical with the immigration into the United States. In a comparative statistical table, published by the French government in 1859, the total emigration during 10 years, from 1848 to 1858, from Great Britain and Ireland, is given at 2,750,000, from Germany at 1,200,000 (this number is given as 1,187,088 in the consular reports), but less than 200,000 from France. Hence it would appear that emigration is almost monopolized by the Germanic nations, among whom, in this respect, Sweden and Norway have since the middle of the 19th century begun to take a place. The total emigration from Europe in 1857 was, according to official statements, 352,378, viz.: 190,600 from Germany, 99,631 from Great Britain, 86,238 from Ireland, 13,802 from France, 8,151 from Sweden and Norway, 5,000 from Switzerland, 1,734 from Holland, 660 from Belgium, and 400 from Italy.—Next to the United States, the British colonies in America and Australia attract the greatest number of emigrants. The emigration from Great Britain and Ireland to British America from 1846 to 1857 averaged 40,000 per annum. The year of the Irish famine (1846) drew thither 109,680 emigrants. The emigration to Australia was formerly for the most part a forced one. From 1793 to 1838, about 74,000 convicts were transported thither. Since then the free emigration has gradually increased; in 1837, it was 2,664; 1838, 6,102; 1839, 7,852; 1840, 5,216; 1841, 12,188; 1842, 5,071; 1848, 23,904; 1849, 32,091; 1850, 16,037; 1851, 21,532; 1852, 87,424; 1853, 61,401; 1857, 61,248. The total emigration to Australia from 1849 to 1859 will scarcely fall short of 550,000. The aggregate of those who have emigrated from the United Kingdom either to British colonies or foreign countries from 1815 to 1853, is given by Mr. McCulloch at 3,793,529. Adding to this the emigration of subsequent years, as stated by other authorities (viz.: 339,524 in 1854, nearly 200,000 in 1855, 165,951 in 1856, 212,875 in 1857), we obtain a total of over 4,500,000 emigrants from the United Kingdom during a period of 43 years.—The emigration from Europe to other distant countries than those in which the Anglo-Saxon race predominates, has always been comparatively insignificant, in spite of all efforts of continental governments to push it in that direction. Algeria, in 1851, full 20 years after its conquest by the French, had an immigrant population of only 65,233. The emigration from France to Algeria amounted in 1856 to 8,564, and in 1857 only to 7,992.—Of the South American states, Brazil as early as 1819 endeavored to attract emigration from Germany and Switzerland, but the manner in which the emigrants were treated by the large property holders frustrated these efforts, although energetically repeated from time to time. Still, a few Swiss and German colonies have, after having passed through the severest ordeals, obtained a considerable degree of prosperity. Among these are New Freiburg, Petropolis, Leopoldina, and San Amarros, all in the neighborhood of the capital, and containing altogether some 12,000 inhabitants. Since 1851 the colonies of Donna Francisca, Blumenau on the Itajahazy, province of Santa Catarina, and Ybicaba, province of San Paulo, have been established. Emigration from Germany and Belgium to Costa Rica and Nicaragua (1850), and from Austria (Tyrol) to Peru (1857–'8), has generally resulted in failure. Emigration from Germany to Chili has been attempted with better success. The agricultural colonies established since 1850 in the province of Valdivia are in a highly prosperous condition, and may in no very remote time form the nucleus of a strong German population on the western slope of the South American continent. In 1859 a joint stock company for the establishment of German emigrant settlements in the republic of Ecuador was organized by German merchants in London under favorable auspices. An isolated case of successful colonization by people of the Roman race is the establishment of about 30,000 Frenchmen and Italians in the Argentine republic near the mouth of the river La Plata. Since 1857 strong efforts have been made in Germany to turn em-

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igration in the same direction, and the hope has been expressed that by this means the La Plata country might be permanently acquired for the German race, but as yet scarcely any thing has been done to that effect.—In Europe, Russia was among the earliest to perceive the advantages of immigration. Peter the Great invited emigrants from all nations to settle in Russia. His successors followed the same policy by granting premiums and valuable privileges, such as exemption from taxation for a certain number of years, exemption from military duty, and free homesteads to colonists. Induced by these advantages, a large number of emigrants from the Palatinate settled in southern Russia in 1784. Immediately after the Napoleonic wars an extensive Germanic emigration to Russia (including Poland) took place. The total number of Germans who emigrated thither between the years 1816 and 1826 is estimated at 250,000. The agricultural colonies of Vielovish, in the government of Tchernigov, and Riebendorf, in that of Voronezh, a manufacturing colony near Pultowa, a Moravian settlement at Sarepta, and a number of German colonies in the Crimea, originated in this way. During the reign of Nicholas emigration to Russia ceased almost entirely, but since the accession of Alexander II. it has, to some degree, commenced anew in the northeastern provinces of Prussia, whence of late a considerable number of agriculturists have emigrated to Poland.—The Austrian government holds out inducements in order to draw a portion of the German emigration to Hungary, but so far with poor success. Immediately after the close of the Russo-Turkish war, the question was seriously discussed whether it would not be possible to regenerate the Orient by turning the tide of westward emigration to the lower Danubian countries and Asia Minor.—Of Asiatic nations, China furnishes the largest number of emigrants, hundreds of thousands of whom settle on the different islands of the Malay archipelago, the British, Dutch, Spanish, and Danish colonies, and also in Australia, the Sandwich Islands, and California. The annual average of Chinese emigration may reach some 200,000, but most of them do not remain permanently abroad. They return to their native country as soon as they have earned enough to live comfortably at home. We may here mention the peculiar system of emigration which within the last few years has been carried on under the auspices of the French government, viz.: the professedly voluntary emigration of negroes from the coast of Africa to French colonies. It is generally considered that this is simply the old slave trade in disguise.—That emigration which is uninterruptedly going on within the territory of the United States among the different states can scarcely be considered under the same head with the emigrations from nation to nation. According to the census of 1850, there lived in the different states and territories of the Union 4,176,225 white persons (viz.: 2,219,331 males, and 1,956,894 females) born out of those states and territories respectively, but within the United States.

EMIR, an Arabic title, meaning prince or ruler, given in Turkey particularly to those thought to be of the line of Mohammed through his daughter Fatima, and to whom, in distinction from all others, belongs the right to wear a green turban. Properly, the emirs constitute with the ulemas only the first of the 4 castes of the Turks, but their number has so much increased that they are now estimated at $\frac{1}{3}$ part of the population of the Ottoman empire, and they are found in every class of people, even among the beggars. Emirs who perform servile duties do not degrade the green turban by continning to wear it; and those who become generals, pashas, ministers, or even grand viziers, also dispense with it on public occasions, lest they may offend the sultan, who has not the honor of wearing it, not being of the race of Mohammed.

EMLYN, Thomas, an English Unitarian divine, born in Stamford, May 27, 1663, died July 30, 1743. He was educated at Cambridge, and after travelling over England and Ireland settled in 1691 in Dublin, where he gained great reputation as a preacher. In 1697 he advanced doctrines upon the subject of the Trinity at variance with those of his congregation, declaring the Father preëminent over the Son and Spirit, and thus reviving Arianism. The opposition which was excited against him obliged him to leave Ireland, and he published in England a work declaring and aiming to justify his opinions. This book brought upon him a prosecution for blasphemy, and he was condemned to the penalty of a fine and a year's imprisonment. He did not pay the fine, but remained in prison 2 years, and after his release preached to a congregation of his friends in London. His character was amiable, and his life irreproachable. Beside his theological writings, which have been republished, he left memoirs of the life and sentiments of Dr. Samuel Clarke.

EMMANUEL, the same as Immanuel, a Hebrew word signifying "God with us." It is used by Isaiah in a prophecy which according to Matthew was accomplished in Jesus Christ, who is thus divinely recognized as the predicted Messiah, the true Immanuel, or "God with us."

EMMET. I. A N. W. co. of Iowa, bordering on Minn., intersected by the Des Moines river; area, about 450 sq. m. In its N. E. part are several small lakes. It has been formed since 1850, and was named in honor of Robert Emmet, the Irish patriot. It is not included in the state census of 1856. II. A new co. of Mich., called also Tonedagana, comprising the northern extremity of the lower peninsula, bordering on Lake Michigan; area, about 200 sq. m. It is not included in the census of 1850.

EMMET, Robert, an Irish revolutionist, born in Dublin in 1780, hanged in the same city, Sept. 20, 1803. He gained high honors at Trinity college, from which he was ultimately

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expelled for avowing himself a republican. He joined the association of united Irishmen, whose object was to separate Ireland from Great Britain and to establish an independent republic, and he was implicated in the rebellion of 1798. After the failure of this attempt he escaped to France, returned secretly to Dublin in 1802, reorganized the malcontents, established various depots of powder and firearms in different parts of the city, and fixed upon July 23, 1803, as the time to seize the castle and arsenals of Dublin. On the evening of that day he directed the distribution of pikes among the assembled conspirators, to whom he delivered an animated harangue. The insurgent band, marching with cheers into the principal street, and being swelled into an immense and furious mob, assassinated Chief Justice Kilwarden, who was passing by in his carriage, but hesitated to follow their enthusiastic leader to the castle, and dispersed at the first volley from a small party of soldiers. Emmet, in disgust at the outrages and pusillanimity of the insurgents, abandoned them and escaped to the Wicklow mountains. After the failure of the first blow he checked the other movements which had been projected, husbanding his resources in the hope of soon renewing the revolt. He might have evaded the pursuit of the government, but a tender attachment which subsisted between him and Miss Curran, the daughter of the celebrated barrister, induced him to return to Dublin to bid her farewell before leaving the country. He was tracked, apprehended, tried, and convicted of high treason. He defended his own cause, delivering an address to the judge and jury of remarkable eloquence and pathos, met his fate with courage, and won general admiration for the purity and loftiness of his motives. His fate and that of Miss Curran are the subjects of two of the finest of Moore's Irish melodies.—

THOMAS ADDIS, brother of the preceding, a politician and lawyer, born in Cork in 1765, died in New York, Nov. 14, 1827. He was graduated at Trinity college, Dublin, studied medicine at the university of Edinburgh, visited the most celebrated schools of the continent, then selected the legal profession, studied 2 years at the temple in London, and was admitted to the bar of Dublin in 1791. He soon became a leader of the association of united Irishmen, and was one of a general committee to superintend all similar associations, having rebellion for their ultimate object. Disclosures being made to the government, he was arrested with many of his associates in 1798, did not deny his purposes, and was finally conveyed a prisoner to Fort George in Scotland, where he was confined 2½ years. After the treaty of Amiens he was liberated and permitted to withdraw to France, the severest penalties being pronounced against him if he should return to Ireland. His wife obtained permission to join him on condition that she should never again set foot on British soil. From Brussels, where he passed the winter of 1802–'3, he saw his brother Robert embark in the enterprise which led him to the scaffold. He came to America in 1804, rose to eminence in his profession in New York, and was attorney-general of that state in 1812. While in prison in Scotland he wrote sketches of Irish history, illustrative especially of the political events in which he had taken part, which were printed in New York in 1807.—

JOHN PATTON, son of the preceding, an American physician, born in Dublin, April 8, 1797, died in New York, Aug. 13, 1842. He came with his father and other Irish exiles to the United States, was educated for 3 years in the military school at West Point, resided for one year in Italy, and studied medicine after his return. His delicate health obliging him to seek a milder climate, he removed to Charleston in 1822, and began the practice of his profession. He was in 1824 elected professor of chemistry and natural history in the university of Virginia, and during several years was a contributor to Silliman's "Journal."

EMMITSBURG, a post village of Frederic co., Md., in the midst of a fertile and thickly populated region; pop. in 1850, 812. It contains several churches, an academy, an asylum for female orphans, an institute for girls, under the care of the sisters of charity, and Mount St. Mary's college and theological seminary, a flourishing institution supported by Roman Catholics, which in 1858 had 24 professors, 126 pupils, and a library of 4,000 vols.

EMMONS, NATHANIEL, D.D., an American theologian, born in East Haddam, Conn., April 20, 1745, died in Franklin, Mass., Sept. 23, 1840. He was graduated at Yale college in 1767, was licensed to preach in 1769, and ordained pastor of the church in Franklin, where he spent his days, in April, 1773. He continued in the pastorate till 1827, a period of 54 years. He claimed to be a genuine Calvinist, though differing from the theological views of Calvin in several important respects. Of some of his peculiar speculations, one is, that there is no such thing as holiness or sinfulness, except in the exercise of the voluntary affections, so that there is no depravity except in voluntary disobedience; and another, that God is the efficient, producing cause of every act of the human mind, thus making the will of God the source of all sinfulness as well as holiness, while every moral act, he would claim, is at the same time perfectly free and voluntary on the part of man. Dr. Emmons was one of the founders and first president of the Massachusetts missionary society, and one of the editors of the "Massachusetts Missionary Magazine." He guided the studies of some 87 theological students. His writings published in his lifetime were numerous, and his complete works, in 6 vols., edited with a memoir by the Rev. Jacob Ide, D.D., were published in Boston in 1842.

EMORY, JOHN, D.D., bishop of the Methodist Episcopal church, born at Spaniard's Neck, Queen Anne's co., Md., April 11, 1789, died Dec. 16, 1835. He was graduated at Washing-

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ton college, Md., studied law, and was admitted to the bar in 1808; but after practising a short time with success, he resolved to devote himself to the ministry, and entered the Philadelphia M. E. conference in the spring of 1810. From 1813 to 1820 he filled some of the most important stations in the church, including Philadelphia, Baltimore, Washington, and other cities, and was sent as a delegate to every general conference, except one, from the time he became eligible until the close of his life. At the conference of 1820 he was chosen to represent the American Methodist church in the British conference, and in 1824 was elected junior agent of the Methodist book concern, and principal agent at the ensuing conference, in 1828. His labors in this department of the church were of great service, and, having placed the institution upon a permanent basis, he was elected bishop by the general conference of 1832. His presidency in all the conferences during the short period of his episcopate was entirely satisfactory. He not only attended the sessions of the various conferences falling in his division of the plan of episcopal visitations, but he entered largely into the subject of education, assisting in the organization of the New York university, as well as the Wesleyan university and Dickinson college. He also directed his attention to the improvement of the ministry, and prepared a course of study which has proved of great service in elevating the standard of ministerial education in the Methodist Episcopal church. He was killed by being thrown from his carriage. Bishop Emory's writings were mainly controversial, among them being "Defence of our Fathers" (8vo., New York, 1827), and "The Episcopal Controversy Reviewed" (8vo., 1838). These, with a life by his son, reappeared in 1 vol. 8vo. in 1841.—ROBERT, son of the preceding, an American clergyman, born in Philadelphia, July 29, 1814, died in Baltimore, May 18, 1848. He was graduated at Colmbia college in 1831, and shortly afterward commenced the study of law. In 1834, upon the reorganization of Dickinson college, he was called to the chair of ancient languages, but resigned his professorship in 1839, in order to embrace the ministry, and entered the Baltimore annual conference of the Methodist Episcopal church. He was, however, in 1842, by the unanimous request of the faculty of the college, recalled, as president *pro tem.*, during the absence in Europe of President Durbin, upon whose resignation Dr. Emory was chosen his successor. This office he held until the close of his life. Beside a life of his father, he left a "History of the Discipline of the Methodist Episcopal Church" (8vo., New York, 1843, revised and brought down to 1856 by the Rev. W. P. Strickland, D.D.), and an unfinished "Analysis of Butler's Analogy," which was completed by the Rev. George R. Crooks, D.D. (12mo., 1856), and has been introduced as a text-book into many institutions of learning.

EMPEDOCLES, a Greek philosopher, born at Agrigentum, in Sicily, flourished about the middle of the 5th century B. C. The son of a rich family, he was instructed by the Pythagoreans, and was acquainted, it is said, with Parmenides and Anaxagoras. Like his father, Meton, the leader of the popular party at Agrigentum, he saved the republic from a dangerous conspiracy, and refused the supreme power when it was offered him. A priest and a poet, a physician and a philosopher, his contemporaries esteemed him as a god; Plato and Aristotle admired him, and Lucretius sang his praises. He saved the life of a woman plunged into a lethargy, from which the art of other physicians was powerless to revive her. He blocked up a mountain gorge through which pestilential winds were driving upon Agrigentum, and at another time stopped the raging of the plague by turning two rivers through a morass. His vanity equalled his ability. He appeared in public only in the midst of a retinue of attendants, with a crown upon his head, sandals of brass on his feet, his hair floating over his shoulders, and a branch of laurel in his hand. He proclaimed his divinity himself, and it was recognized throughout Sicily. In acting his part and spreading his ideas among men, it was his aim not less to affect the imagination than the reason. In his old age he left Sicily, not, as has been said, to converse with the priests of Egypt and the magi of the East, but to teach philosophy in Greece. He visited Thurium and Athens, sojourned in the Peloponnesus, and read a poem at the Olympic games which gained the applause of all Greece. His last days were passed in obscurity in the Peloponnesus. Some imagined that he was translated to heaven and received among the gods; others that he was drowned in the sea, that he fell from his chariot, that he was strangled by his own hand, or that he plunged into the crater of Etna, in order by hiding his body to certify his divinity, but that the volcano subsequently belched forth one of his sandals. Of all these fables the last, which has been the most widely received, is the most preposterous. The works of Empedocles were all in verse, embracing tragedies, epigrams, hymns, and an epic. The most important of them were two didactic poems, one on "Nature," treating of cosmology, physiology, and psychology all together; the other on "Purifications," treating of worship and magic, and containing his religious precepts. Fragments only of these remain, but those of the treatise on nature are sufficient to give an idea of the plan of the work. It consists of 3 books: in the first, after stating the conditions of human knowledge, he treats of the universe in general, of the forces which produce it, and the elements which compose it; in the second, of natural objects, of plants and animals; and in the third, of the gods and divine things, and of the soul and its destiny. Even in philosophy, Empedocles remains a poet. A Homeric spirit, as Aristotle calls him, he personifies and deifies every thing, and robes himself in symbols and mystery. The doctrine of Empedocles is developed in the "Sophist," the

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"Meno," and the "Phædo" of Plato, and in the "Soul" and the "Metaphysics" of Aristotle. The best edition of his remains is that by Karsten (Amsterdam, 1838), which is furnished with admirable dissertations.

EMPEROR (Lat. *imperator*, commander), a title bestowed in the Roman republic on chief commanders of great armies, on consuls elect before entering upon their office, and often used by victorious troops to hail on the battle field a successful general. In later times it designated the highest authority in the state. Cæsar, returning from his last campaign, after the victory of Munda (45 B. C.), and Octavianus Augustus, after the battle of Actium (31 B. C.), assumed this now regal title in preference to the odious *rex*, and Rome became an empire. Augustus and his successors took in addition the name of Cæsar, and both the title and the name (*Kaiser*) were afterward adopted by monarchs of other states. When the rule of the Roman empire was divided, the name Cæsar designated the adopted assistant of the emperor, who was himself honored by the title of Augustus. These titles disappeared in the West with the fall of Rome (476), but were saved in the eastern or Byzantine empire for nearly 10 centuries, not by the virtues or warlike spirit of those who bore them, but by the happy location of the capital, by the Greek fire, and Grecian bribery. During the crusades we find also a Nicæan and a Trapezuntine empire in the East. But all these eastern states were swept away and replaced by the power of the Turks, whose sultans, however, never officially adopted the title of the vanquished Christian monarchs. This had been restored in the meanwhile in the West by Charlemagne, who received the imperial crown from the hands of Leo III. at Rome on Christmas day, 800, and was hailed by the people with shouts of "Life and victory to Carolus Augustus, the God-sent, pious, and great emperor of Rome, the bringer of peace." When the empire of this great Frankish monarch was divided by his grandsons, the title of emperor of Rome was given to the eldest of them, the king of Italy, and his descendants bore it until it was taken (962) by the mightier king of Germany, Otho I. And now began a long series of expeditions to Italy, undertaken by the German monarchs, in order to be crowned in Milan with the iron crown of Lombardy, and in Rome by the pope with that of the Roman empire; a series of struggles between the emperors, claiming the sovereignty of the Roman world according to their title, and the popes, claiming the same as successors of St. Peter; between the worldly and spiritual heads of the Christian nations, the Othos, the Henrys, and the Frederics, and the Gregorys, the Alexanders, and the Innocents. German bravery and Italian diplomacy, the sword and the bull, were by turns victorious and vanquished; emperors were humiliated, popes were ignominiously stripped of their dignity; Germany was distracted and Italy desolated. But new states had grown, new ideas sprung up, new aspirations arisen; the reformation struck boldly at the pope, and indirectly at the empire. It was at that time that the German kings, who usually had been elected as such, exclusively from Frankish or German houses, in earlier times by all, but later only by the greatest princes of Germany, who were hence called electors, gave up their Roman imperial pretensions, and were crowned in Germany as emperors of that country. At their coronation, celebrated in Aix la Chapelle, Augsburg, Ratisbon, or Frankfort, with great display both of splendor and servility, the emperors were obliged to sign an instrument, called capitulation, containing the conditions under which they were raised to their dignity. They lived in *palatia* set apart for their use (*Pfalzen*), in later times in their hereditary dominions. The wars of the reformation broke the ancient forms and institutions; the imperial dignity became almost hereditary in the house of Austria; the other German states were made nearly independent; Prussia became a kingdom under Frederic I.; the unity of Germany was virtually destroyed. The wars that followed the French revolution wrought still greater changes, and when Napoleon had assumed the imperial dignity (1804), and founded the Rhenish confederacy, Francis II. in 1806 changed his title into that of emperor of Austria (as such Francis I.), and what was once the Roman, now the German, empire expired. Its restoration was during the revolutionary period of 1848–'9 the favorite idea of a party in the Frankfort parliament. The refusal of the king of Prussia to accept the imperial crown made the scheme a failure. In the meanwhile several other monarchies of Europe had taken the imperial title. Russia assumed it under Peter the Great (1721), and the assumption was in time acknowledged by all the states of Europe. The empire of the French, founded by Napoleon on the ruins of the republic, perished at Waterloo (1815), to be revived after two revolutions by the nephew of its founder (1852). On the American continent several empires have been established, but most of them destroyed by revolutions. That of Mexico under Iturbide (1822) was ephemeral; that of Brazil is governed constitutionally; that of Hayti, which was nominally constitutional, was overthrown in Jan. 1859, and replaced by a republic. The Asiatic states of China, Japan, and Anam, the African Fez and Morocco, are also often called empires.

EMPHYSEMA, a diseased condition of man and animals, in which gases are developed in or have been introduced into any part of the body; restricted, however, generally to the dilatation of the cells of areolar tissue or of the lungs by atmospheric air. Gaseous collections in serous cavities, or in canals lined with mucous membrane, have received other special names. Three kinds are usually described, which may be called surgical or traumatic, spontaneous, and pulmonary emphysema. Traumatic emphysema, though always subcutaneous in the com-

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mencement, is not always accompanied by wound of the skin; it may occur after severe contusions of the chest, or after fracture of the ribs, the air cells of the lungs being ruptured, and in the latter case punctured by the broken bone, with or without external communication. In any of these conditions, if the wound of the lung be small, and especially if it be not in direct connection with an opening in the skin, the respired air, not being able to pass out freely, becomes infiltrated in the areolar or cellular tissue, forming a soft and crepitating swelling, which may extend over a great part of the body; during inspiration the air escapes into the cavity of the chest through the wound in the lung, and during expiration, being compressed between the lung and the thoracic walls, it is forced into the subcutaneous cells, the amount tending to increase at each performance of the respiratory act. Emphysema may arise from any portion of the air passages, and frequently is seen accompanying wounds of the larynx and trachea; if the external wound be extensive, and the opening in the lung or trachea small, this complication is not likely to occur. The ordinary symptoms are painful constriction of the chest at the injured part, and difficulty of breathing, which may become almost insupportable, and even produce death by suffocation. The swelling of emphysema may be distinguished from effusions of fluids under the skin by its crepitation and elasticity, by its not pitting on pressure of the finger, and by the absence of redness, pain, and weight. After distending the cellular tissue under the skin, the air may penetrate between the muscles, along mucous canals, vessels, and nerves, to the inmost recesses of the organism. The treatment consists in letting out the confined air by minute punctures with a lancet, by preventing its reaccumulation by proper bandages, and in cases of extreme oppression by paracentesis or incision of the thoracic walls; the cure may be hastened by antiphlogistic measures, and by stimulating applications and frictions. In Europe it is not uncommon for persons desirous of securing immunity from military service, and for purposes of mendicancy and deception, to artificially inflate with air various parts of the surface of the body, and to pretend that their condition is the result of chronic or congenital diseases; the treatment in these cases consists in scarifications, bandages, and tonic frictions. After exposure to great cold, in certain cases of internal poisoning and of poisonous bites, after copious bleedings and various severe accidents, and in debilitated conditions accompanied by gangrene, there occasionally arises an emphysematous complication, which is treated in the same manner as the preceding variety.—Pulmonary emphysema may be either vascular or interlobular. In the first the vesicles are enlarged, ruptured, and united together, and the lungs, when the chest is opened, may be so distended, more especially the upper lobes, as to protrude from its cavity; when only one side is affected, it presses upon and displaces the heart and the other lung; such diseased portions are strongly crepitant, part with their contained air with difficulty, and float very lightly on water. In interlobular emphysema the distended vesicles assume an irregular form, sometimes of considerable size, and are situated just under the pleura; they may be made by pressure to move under the serous covering as far as the next lobular division of the organ; sometimes the enlarged vesicles are not in the subserous tissue, but in the tissue separating the lobules, between which they may descend to a considerable depth. These varieties are usually combined, their symptoms are the same, and the latter is generally considered the consequence of the former, the distention and rupture of the vesicles proceeding to a greater extent. Laennec and Piorry maintained that pulmonary catarrh was one of the principal causes of the dilatation of the vesicles, which, unable to free themselves from the viscid mucus without great effort, of necessity became enlarged; Louis seems to consider that there is some power of active dilatation brought into play, though he gives no satisfactory definition of the agency. Admitting the connection between emphysema and obstructed bronchi, with the first-named authors, there is no necessity for making the former a direct consequence of the latter; measured by a pressure gauge, the forced expiratory act has been found $\frac{1}{4}$ more powerful than the act of forced inspiration; as Dr. W. T. Gairdner has well observed (in his work on bronchitis), whenever viscid obstructions are to be removed from the air passages, the air is gradually expelled from the affected part of the lung by expiration, and they become collapsed in proportion to the obstruction. Emphysema is the direct opposite to bronchial collapse, and the indirect consequence of it; because, whenever a part of the lung is obstructed or collapsed from bronchitis or any other cause, the air during inspiration must rush with greater force and volume into the portions still freely open. Bronchitic accumulation and collapse are most common at the posterior and lower part of the lungs, and emphysema on the free anterior borders; the emphysematous portions are easily inflated from the bronchi, while the collapsed parts are not. Emphysema is, therefore, essentially a mechanical lesion from distention of the air cells, in proportion to which the flow of blood through the ultimate capillaries of the lungs is arrested, causing absorption of their walls, and tension and obliteration of their vessels. In the case of Mr. E. A. Groux, with congenital fissure of the sternum, in the course of prolonged forced expiration, the chest and abdomen become smaller, the veins at the root of the neck swollen, the upper intercostal spaces convex, and the fissure assumes its greatest width; and above the pulsatile cardiac tumor is a protruding mass which percussion shows to be the anterior portion of the upper lobe of the right lung. This can throw little light on the ordinary

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causes of emphysema, though the cells are doubtless dilated, because the protrusion is evidently due, not so much to the obstructed passage of air or blood, as to active muscular effort, and to the raising of the whole thoracic contents by the diaphragm and abdominal muscles in a cavity whose bony wall is deficient in front, where of course the free portion of the lung would protrude. Emphysema has been traced to compression of the bronchi by tumors; to the great respiratory efforts required in playing on certain wind instruments, showing the connection between this disease and forced expiration, and as partly exemplified in the above case of Mr. Groux; the disposition to this disease has also been considered hereditary, and doubtless many cases of so called hereditary phthisic or asthma are due to the vesicular dilatation consequent on spasmodic bronchial contractions. It is found in both sexes, at all ages, and in all constitutions; once developed, it remains during life, sometimes stationary, but generally increasing, with irregular intervals of ease; the dyspnœa is sometimes such that the patient is obliged to sit up in order to breathe; slight causes, as a catarrh, exposure to irritating gases or dust, or vivid emotions, are sufficient to bring on an attack. Examination of the chest will show an enlargement of the affected side at the upper region of the ribs and intercostal spaces. On percussion the chest is very sonorous, and the respiratory sounds feeble, with râles sonorous, dry, or humid, according to the accompanying catarrhal condition, and the presence or absence of cough. It is a very common disease, generally chronic in its nature, but sometimes acute and speedily fatal. It may be known by the occurrence of dyspnœa, without palpitations, disease of the heart, œdema, or fever, and often without any signs of catarrh. The principles of treatment are to guard against pulmonary congestion by proper depletives, to diminish the frequency of respiration by opium and other sedatives, to strengthen the weakened system by tonics, to relieve the obstructed bronchi by emetics and expectorants, and to avoid all the exciting causes of catarrh and bronchitis, the most frequent originators and aggravators of the disease.

EMPSON, William, a British author and critic, born in 1790, died at Haileybury, near Hertford, Dec. 10, 1852. He was educated at Winchester and at Trinity college, Cambridge, and upon the retirement of Sir James Mackintosh became professor of law at the East India company's college at Haileybury, a position which he occupied until his death. Subsequent to 1840 he was the editor of the "Edinburgh Review," to which his contributions were numerous. That which attracted most attention was on Stanley's "Life of Arnold." He married the only child of Francis Jeffrey, who addressed to him some of his most interesting letters.

EMPYREUM, or Empyrean (Gr. ἐν, in, and πῦρ, fire), a name given by the fathers of the church and the ancient theologians to the highest point of the heavens, where was the habitation of the Deity, according to the description of St. Paul, *Lucem Deus habitat inaccessibilem*, and where the saints enjoyed the beatific vision.

EMS, or Bad-Ems, a German watering place in the duchy of Nassau, on the Lahn, 15 m. N. from Wiesbaden, to which and to Baden-Baden it is inferior in extent and splendor; pop. about 4,000. It is shut in by mountains, surrounded by picturesque scenery, and has a terrace by the river side serving for a promenade. The *Kurhaus*, a large chateau, formerly a ducal residence, is let in apartments to visitors, beside which the place has a number of lodging houses, and a new *Kursaal* built by the grand duke at the side of the Lahn, containing a *café*, a ball room, and gambling saloons. The number of visitors is about 4,000 or 5,000 annually, comprising many English and Russians. The revenue from the gaming tables forms an important item in the receipts of the duchy of Nassau, but the duke's subjects are not permitted to play. The springs, which have been famous since the 14th century, and are supposed to have been known to the Romans, are used for both bathing and drinking. The waters are more or less impregnated with carbonic acid, have a temperature of from 93° to 135° F., and are esteemed for their efficacy in nervous, liver, and dyspeptic complaints, and also in diseases of the chest and eyes.

EMS (anc. *Amisia* or *Amisius*), a river of N. W. Germany, rising in Lippe-Detmold, passing through Hanover, and flowing into the Dollart. It is an important channel of communication, is navigable about 13 m. by vessels of 200 tons, and is 234 m. long.

EMSER, Hieronymus, one of the most active opponents of Luther among the Roman Catholic theologians of Germany, born in Ulm in 1472, died Nov. 8, 1527. In 1502 he became professor at the university of Erfurt, where Luther is said by him to have been among his pupils. In 1504 he established himself at Leipsic, where he also lectured at the university, and in the year following Duke George of Saxony made him his secretary. With Luther and the theologians of Wittenberg generally he was on good terms until the disputation of Leipsic in 1519, from which time he made, in union with Dr. Eck, incessant endeavors to oppose the increasing influence of Luther and the progress of Protestantism. The German translation of the Bible by Luther was attacked by him as erroneous, whereupon it was forbidden in Saxony by Duke George. Emser then himself published a translation of the New Testament into German, made from the Vulgate (Dresden, 1527). He also wrote *Vita S. Bennonis*, as he ascribed to St. Benno his recovery from a severe sickness.

EMU (*dromaius Novæ Hollandiæ*, Latham), a bird closely allied to the cassowary, a native of New Holland and the adjacent islands. The emu differs from the cassowary in its broader bill, in its head covered with feathers above, and in its smaller and more obtuse claws; as in the latter, the cheeks and sides of the neck

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are naked, the legs long and robust and protected by strong scales, and the wings and tail not apparent; the middle toe is the longest, the inner the shortest. This bird was named emu by the English colonists, who confounded it with the cassowary or emu of the Moluccas; to distinguish them, ornithologists call the present bird New Holland emu. There is only one species of the genus, living in the *eucalyptus* and *casuarina* forests in the Australian islands. Its length is about 7 feet; its plumage is thick, and of a brownish color. The feathers are remarkable from their two central stems being united at the base, bearing simple barbs, and sometimes very short barbules. The form is thick and heavy, the back arched, the denuded neck of a violet color, and the feathers on the head are few, simple, and hair-like. The emu presents the closest analogy to the ostrich in its anatomical structure; a wide membranous sac is formed below the crop by a dilatation of the œsophagus, which ends in a slightly developed gizzard; the intestinal canal is about 16 feet long; the windpipe is very long, and at its 52d ring opens into an immense muscular sac, whose use is not well ascertained; according to Wagner, the bones of the wrist are wanting in this bird. The natives of New South Wales call the emu *parembang*. It is a timid bird, running with great rapidity, and very rarely taken; it was once common in the neighborhood of Sydney, but civilization has now driven it beyond the Blue mountains. It prefers open shrubby places and sandy plains. When pursued it takes readily to the water, and swims with its body mostly submerged. It feeds on fruits, berries, roots, and various herbs. The female lays 6 or 7 eggs, in a slight hollow scratched in the earth; the male hatches the eggs, and takes care of the brood until they can provide for themselves; the young are of a grayish color, with 4 bands of bright red. The flesh is eaten by the natives, and is said to have the taste of beef.

ENALIOSAURIANS (Gr. ἐναλιος, marine, and σαυρος, a lizard), an order of fossil marine reptiles, found in the liassic, triassic, and cretaceous epochs. They present the strangest forms, uniting in their structure characters which appear at first sight incompatible. They have the vertebræ of fishes, the teeth of crocodilians, the body of lizards, the paddles of cetaceans or marine turtles, and some have a long snake-like neck. Many of these aquatic saurians attained a large size, and from their voracity must have been the terror of the waters of the secondary epoch, after the disappearance of the great sauroid fishes of the carboniferous period. Pictet considers them as coming nearest to the saurians, though so different from any existing types as to require the establishment of a new order, whose principal characters are biconcave vertebræ, wider than long, with laminæ feebly united to the bodies; conical teeth, without cavity at their base, implanted in short deep-seated alveoli; and 4 short, flattened limbs, whose fingers are formed by discoidal bones disposed like those of cetaceans. They have been divided into 2 groups, whose characters correspond also to their geological position. The ichthyosaurians (including the *ichthyosaurus* and *plesiosaurus*) have well-developed crania, with small fossæ and cavities; these have been found in the jurassic and cretaceous strata. The other group, the simosaurians (including *nothosaurus*, *simosaurus*, &c.), have the cranium with very large temporal fossæ and orbital and nasal cavities; they are found only in the triassic strata. The first two genera are the best known, and the most common in the strata of England and Germany; the *ichthyosaurus* must have attained a length of nearly 25 feet, and the *plesiosaurus* of more than 12, and both presented forms most unlike those of any existing animals, though admirably adapted to the circumstances in which they lived. (See ICHTHYOSAURUS, and PLESIOSAURUS.)

ENAMBUC, PIERRE VANDROSQUE DIEL D', a French navigator, born in Dieppe, died in St. Christopher, W. I., Dec. 1636. Being of an adventurous spirit, he sailed from Dieppe in 1625 in a brigantine of 8 guns, for the Antilles. He landed in the island of St. Christopher on the same day with a party of English colonists, with whom he divided the island, and, until his death, held the French half of the colony with extraordinary tenacity. In 1635 he took possession of Martinique in the name of the king of France, and founded the town of St. Pierre.

ENAMELLING, the art of applying a coating of vitreous substances called enamels to a surface of glass or of metal, and baking this in by a fusing heat. In its homeliest application it is a sort of glazing, and as applied by modern methods to ornament and protect surfaces of cast or wrought iron, it may be considered simply a process of JAPANNING, which see. By the facility with which colors might be introduced in the vitreous compounds or applied to them and become fixed by a second baking, the art was in early times exceedingly popular, and in the middle ages it attained a higher rank even than it now holds, as one of the fine arts. The ancient Persians and Arabians appear to have practised it upon earthenware and porcelain; and the mode of coloring this ware at the present day is properly a process of enamelling, as will be seen in the description to be given of this manufacture. Articles of pottery enamelled in colors are found among the ruins of ancient Thebes, and in many of the cities of Egypt are buildings constructed of enamelled bricks taken from the ruins of older cities. Wilkinson states that "it has been questioned if the Egyptians understood the art of enamelling upon gold or silver, but we might infer it from an expression of Pliny, who says: 'The Egyptians paint their silver vases, representing Anubis upon them, the silver being painted and not engraved;' and M. Dubois had in his possession a specimen of Egyptian enamel." From the Egyptians the art is supposed to have passed to

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the Greeks, and afterward to the Romans. Brongniart, however, in his *Traité des arts céramiques*, traces its introduction into Italy from the Balearic isles by the Spaniards, who derived the art from the Arabs. The Romans introduced it into Great Britain, as appears from various enamelled trinkets that have been dug up there with other vestiges of the Roman conquerors. That the Saxons practised the art appears from an enamelled jewel found in Somersetshire, and preserved at Oxford, which bears an inscription stating that it was made by direction of the great Alfred. The gold cup given by King John to the corporation of Lynn in Norfolk shows, by the colored enamelled dresses of the figures with which it is embellished, that the Normans also practised the art. Among the Gauls enamelling upon metallic surfaces is understood to have been in use in the 3d century. As practised upon earthenware in the style called by the French *faïence commune ou émaillée*, and by the Italians *majolica* ware, it was carried to great perfection in the 16th century at Castel Durante and at Florence by the brothers Fontana d' Urbino. Other Italian cities adopted the favorite art, and Faenza became famous for the works of Guido Selvaggio. The articles produced in this style were rather objects of luxury than of use. Some were utensils for the tables of princes, adorned with the most delicate sculptures and splendid paintings. There were also vases of numerous forms, small flasks covered with tendrils, figures of saints, birds of brilliant plumage, painted tiles, &c., all formed merely of baked clay covered with an opaque enamel composed of sand, lead, and tin, upon which the designs, in some instances those of Raphael, were painted in enamel colors and baked in. This high style hardly outlived the artists who perfected it; and from 1560 it gradually deteriorated. Bernard de Palissy, by practice of 25 years directed to the production of a cup like one of great beauty shown to him, sought to introduce the art in France, and his works became very famous, but his method died with him. His productions were interesting as true copies of natural objects, in relief, and colored with exact faithfulness. Some of these objects were fossil shells from the Paris basin. Of late years the art has been revived in France, chiefly through the skill of M. Brongniart; and in Berlin also beautiful work of the kind has been executed by M. Feilner.—Painting in enamel, as practised upon plates of gold and copper, can hardly be regarded as applied to works of high art until the 17th century. Jean Toutin, a goldsmith at Châteaudun, appears about the year 1630 to have first made enamels of fine opaque colors, and applied them to portraits and historical subjects. Other artists profited by his instructions, and several miniature painters attained great distinction in this branch. The art afterward fell into disuse, and was only applied to ornamenting watch cases and rings. In the early part of the present century it reappeared in some fine portraits by Augustin, and various French and English artists have since executed many fine portraits in this style, distinguished for the brilliancy of their colors, and the more valuable for their permanency. A piece of 5 inches in its longest dimensions was considered the largest that could with safety be undertaken; for with the increase of size the liability of injury to the enamel by cracking, and to the plate by swelling and blistering in the several processes of baking, rapidly increased; but by backing the metallic plate with one of porcelain, the work is now executed in pieces of much larger dimensions, even 18 inches by nearly as great a breadth. The process is usually conducted as follows. The plate is coated on both sides with a ground of white enamel, and on this the design is lightly sketched with a pencil, using red vitriol mixed with oil of spike. The colors, finely ground and mixed with oil of spike, are then laid on as in miniature painting. By gentle heat the oil is evaporated, and in an enameller's fire the plate is next made red-hot to incorporate the colors with the enamel. The painting may then be retouched, and the colors, again be burned in, and this may be repeated several times if necessary. But the greatest accuracy in the first drawing and coloring is essential for a perfect picture. In this department may be consulted the work of Count de Laborda, *Notice des émaux exposés dans les galères du Louvre*.—In the ordinary processes of enamelling, the enamels used for the ground are opaque, and must bear a higher degree of heat without fusing than the colored enamels, which are afterward melted into them. They are made after a great variety of recipes, according to the uses to which they are to be applied. All those designed for metallic surfaces have a transparent base, which is rendered opaque by the substitution of combined oxide of lead and oxide of tin, in the place of the oxide of lead used as one of its ingredients. Five different mixtures of the two oxides are in use, the proportions varying from 3½ parts of lead and 1 of tin to 7 parts of lead and 1 of tin. The two metals, in the desired proportion, are melted together, and the combined oxide is removed as fast as it appears upon the surface. When the oxidation is as thoroughly effected as practicable, the product is well washed to remove any particles of metal that may have escaped oxidation, as these would greatly impair the quality of the enamel; for the same reason it is essential that the metals themselves should be absolutely pure and free from the usual alloys found with them. One or other of the mixtures of oxides obtained by the method described is next melted with proper quantities of silica (pounded quartz), saltpetre, and a little borax; the last gives greater fusibility as its proportion is increased, and no more is used when the enamel is to be applied upon copper or silver than upon gold. The plates are sometimes chemically acted on by the enamel, and if the gold of the gold plates is alloyed with too much copper, the effect of this is perceived

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in injuring the appearance of the enamel. For making colored enamels, either the opaque or transparent enamel serves as a base, and with it is melted a suitable proportion of some metallic oxide as a coloring matter; for a blue enamel, the opaque is used with oxide of cobalt; for a green, oxide of chromium, or binoxide of copper; for a violet, peroxide of manganese; for a yellow, chloride of silver; for a purple, purple of Cassius; and for a black, the transparent enamel is used with mixed oxides of copper, cobalt, and manganese. The different enamels, being prepared beforehand, are when wanted for use crushed to powder, and then kept at hand under water in vessels well covered to protect them from all impurities. The metallic surfaces to be coated are cleaned by boiling in an alkaline solution, and are then washed with pure water. The copper alloy in gold may be dissolved from the surface by boiling in a strong solution of 40 parts of saltpetre, 25 of alum, and 35 of common salt.—In the manufacture of enamelled earthenware, the white enamel is prepared by melting 100 lbs. of lead with 15 to 50 lbs. of tin, and adding to the oxides thus obtained the same weight of quartz sand, and 30 lbs. or thereabout of common salt. The whole being well rubbed together is melted; and though it may appear of dark color, it afterward becomes white when reduced to powder and baked upon the utensils. The proportions of the materials employed are very variable, and other ingredients also are often introduced, particularly oxide of manganese, the effect of which in small quantity is to yield its oxygen to any carbonaceous impurities that may be present, and remove these in the form of carbonic acid from the melted mass. The colored enamels are applied by painting them when finely ground, and mixed with some vegetable oil, as that of spike lavender, upon the white enamel, either before or after this has been once heated, and then baking them in. The ovens for metallic articles are muffles made to slide closely into the furnace, and furnished with a small apertnre through which the progress of the operation may be observed.—The enamelling of cast iron cooking utensils was practised at the close of the last century, and a number of different mixtures of the materials employed have since been in use. The use of lead must be carefully avoided in articles of this kind. Vessels of wrought iron are also treated by the same process; and iron pipe for conveying water is advantageously protected by a clean silicious enamel not liable to affect the purity of the water.—The patent right of Messrs. Clarke of England, of 1839, consisted in the use of the following composition and method: 100 lbs. of calcined ground flints and 50 lbs. of borax calcined and finely ground, to be mixed, fused, and gradually cooled. Of this, 40 lbs. are mixed with 5 lbs. of potters' clay, and ground in water to a pasty mass. The vessel, first thoroughly cleaned, is lined with a coating of this about $\frac{1}{4}$ of an inch thick, and left for it to harden in a warm room. A new coating is next added prepared from 125 lbs. of white glass without lead, 25 lbs. of borax, 20 lbs. of soda in crystals, which have been pulverized and fused together, ground, cooled in water, and dried. To 45 lbs. of this 1 lb. of soda is added, the whole mixed in hot water, dried and pounded. A portion of it is sifted over the other coating while it is still moist, and dried in a stove at the temperature of boiling water. The vessel is then heated in a stove or muffle till the glaze fuses. It is taken out, more glaze powder is dusted on the glaze already in fusion, and it is again subjected to heat. The process now employed successfully by Messrs. T. F. Griffiths and co. of Birmingham, of coating the interior surface of wrought iron vessels, consists in first brushing it over, when thoroughly cleaned, with a solution of gum arabic; on this is sifted a fine vitreous powder, consisting of 130 parts of powdered flint glass, 20½ of carbonate of soda, and 12 of boracic acid. These are to be well mixed, melted in a glass maker's crucible, and pulverized so as to pass through a sieve of 60 holes to the inch. The article thus coated is placed in an oven heated to from 212° to 300° F., and when dry is removed to another oven, and heated to a bright red till the glass is seen through the aperture to be melted. It is then taken out and annealed. A second application is made if the first prove imperfect. Great care is required that the glassy preparation be protected from mixture with foreign matters, and it is well to glaze the interior of the crucibles before using them. Colored enamels may afterward be applied to the surface of the white coating if desired. By this method iron plates have been made to imitate marble, and mantels for fireplaces, tables, &c., have been produced in New York almost equal in beauty to the originals. There is, however, a tendency in the plates to warp by heat, and in the enamel to scale off; and this latter defect is a serious objection to the enamelled iron cooking utensils sold in the United States. The metal and the glaze do not expand and contract together.—Small articles of enamel, as little toys imitating the figures of birds, &c., and also artificial eyes, are made by melting with the table blowpipe rods or tubes of enamel prepared for this purpose, and shaping them by hand, just as the glass blower works with tubes and rods of glass. Artificial eyes are thus made with great perfection.—Enamelling of slates to imitate marble and malachite was introduced in London not many years since by Mr. G. E. Magnus; and the specimens, then quite novel, exhibited at the great exhibition of 1851, received high praise in the report of the juries, and a prize medal was awarded to the exhibitor. The art was first practised in the United States at Boston, and slates from Wales were imported to be used for this purpose. Subsequently the slates of the Lehigh river were applied to this use in Lehigh co., Penn., and were also sent to Philadelphia to be there enamelled. In Vermont the same business is now carried on at West Castleton, where are exten-

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sive quarries of slate, and an establishment of the same kind is in operation in New York. A great variety of useful articles are produced, among which the most important are billiard and other tables, mantels, tubs for bathing, sinks, &c. The slates as received from the quarries are first sawed to proper shape, then planed to uniform thickness, and rubbed smooth with polishing stones. The ground color adapted to the marble it is designed to imitate is then laid on, and after this the variegated colors. The slab is then placed in an oven heated to 200°, and allowed to remain over night. In the morning after cooling it receives a coat of varnish, and is returned to the oven till the next day. Other heatings and varnishings alternately succeed, with rubbing with pumice stone, and a final polishing with pumice stone, rotten stone, and the hand, completes the process.

ENAREA, or ENARYA, a country of E. Africa, W. of Abyssinia, between lat. 6° and 8° N. and long. 33° and 37° E., 15 days' journey from the Nile. It is elevated above the adjacent regions, traversed by a range of hills, in many parts densely wooded, fertile, and watered by several rivers. It is peopled by Gallas, among whom are found a few Mohammedans and Abyssinian Christians. It exports slaves, ivory, gold, coffee, horses, musk, and the skins of various wild animals, in exchange for rock salt (the national currency), beads, daggers, knives, guns, kitchen utensils, copper, and cotton goods. The capital, Sakka, is a considerable place, not far from the banks of the river Kibbe, and is visited by caravans which come from the Nile and from Gondar in Abyssinia.

ENAULT, LOUIS, a French writer, born at Isigny, Calvados, in 1824. After having travelled in various countries and visited the East in 1853, he went in 1854 to Northern Europe. His *Constantinople et la Turquie* appeared in 1855, and his *Voyage en Laponie et en Norvège* in 1857. He has been a frequent contributor to the leading reviews and newspapers of Paris under the *nom de plume* of Louis de Vermont, and has made translations from Goethe's *Werther*, Mrs. Stowe's "Uncle Tom's Cabin," and from the works of Dickens. He is now the literary critic of the Paris *Constitutionnel*.

ENCAUSTIC (Gr. *ἐν*, in, and *καυστικος*, burning), a term applied to the method of fixing colors upon objects by burning them in. Enamelling in colors is an encaustic process. The word is most commonly used in its application to an ancient method of painting, in which wax was employed with the colors, and a coating of the same material was finally applied to the picture to preserve it from the action of the atmosphere and light. In modern use a peculiar kind of tiles are called encaustic; and by the French the same epithet is applied to preparations of wax used for polishing and protecting the surface of wood. The little that is known of the ancient art of encaustic painting is derived from the mention made of it by Pliny ("Natural History," lib. xxxv. ch. xi.), Marcianus (lib. xvii.), and Julius Paulus (lib. vii. *et seq.*). Count Caylus called the attention of the French academy of belles-lettres to it in 1755; and M. Bachelier, author of a treatise *De l'histoire et du secret de la peinture en cire*, had produced a picture in wax in 1749. In 1829 M. de Montabert, in his *Traité des tous les genres de peinture*, favorably noticed the process, and M. Durozier of Paris soon after announced that he had perfectly succeeded with the method given by Montabert. The ancient methods appear to have consisted in the use of wax crayons, in which the colors were embodied, and which were used upon a heated surface, the outline of the picture having been first traced. The whole was afterward covered with a varnish of wax melted in and polished. The method of Count Caylus consisted of rubbing and melting wax into the canvas or panel, then coating the surface with Spanish white, and painting upon this with water colors. By warming the picture the colors are absorbed into the wax, and thus protected. Mr. J. H. Muntz recommends waxing only one side of the canvas, painting on the other in water colors, and then melting the wax through to fix them.—ENCAUSTIC TILES consist of a body of red clay, faced with a finer clay, which bears the ornamental pattern, and strengthened at the base with a thin layer of a clay different from the body, which prevents warping. The clay of the body is exposed to the weather for 6 months or more, and is afterward thoroughly worked over and tempered, and mixed with other substances, and at last evaporated at the slip-kiln. From a cubical block of this, formed in the usual method by slapping, a square slab is cut off with a wire, upon which slab the facing of finer clay colored to the desired tint is batted out and slapped down; a backing is then applied in the same way to the other side of the tile. It is then covered with a piece of felt, and put into a box press; a plaster of Paris slab containing the pattern in relief is then brought down upon the face of the tile, and the design is impressed into the soft tinted clay. The hollows thus formed are filled with a semi-fluid clay of a rich or deep color poured into them and over the whole surface of the tile. In 24 hours this has become sufficiently hard to admit of the surplus clay being removed, which is done by placing the tile, still in the box, upon a horizontal wheel, and as it revolves applying a knife or scraper entirely across, so as to rest upon the edges of the box. The surface is thus cut down so as to expose the pattern and the ground. The defects are removed with a knife, and the edges after being squared are rounded off with sand paper. The tiles are kept for a week in a warm room called the green-house, and the drying is afterward completed in another called the hot-house. They are then baked like other articles of pottery, except that double the ordinary time is given to the process, and the oven is left 6 days to cool before the tiles are taken out. They contract in baking from $\frac{1}{8}$ to $\frac{1}{16}$ of their dimensions. The process is supposed to be

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nearly the same as that employed in the middle ages in France and England in making pavements for churches, and also for the beautiful pottery called Henry II.'s ware, peculiar to France in the 16th century.—The French apply the term *encaustic* to preparations of wax used for polishing furniture. (See FRENCH POLISH.)

ENCHASING, or CHASING, a process analogous to that of sculpture, being the art of finishing ornamental designs in raised work upon surfaces of sheet metal. When these designs have received their general form by casting, hammering, or other means, the work is finished, all but polishing, with punches or chasing tools. These are of a great variety of shapes and sizes, fitted to correspond with the minute details of the most complex work. Some are grooved and checkered at the ends, and some are nicely polished. They act on a small scale like the dies used for striking coins and medals; and the smallest of them are struck with hammers of diminutive size. In order that the form of hollow articles may not be injured in the operation, these are filled with a composition of melted pitch and brick dust or rosin, or with pitch alone. They are moreover supported upon a sand bag like those used by engravers. Works in copper and brass are sometimes filled with lead to give them a firm support within; but this will not do for articles in gold and silver, which melted lead would seriously injure. The models upon which the sand moulds for receiving objects intended for chasing are prepared, are themselves sometimes chased nearly to the required forms. Excellent specimens of chased work are seen in pieces of ancient armor, and in vases and other ornaments in gold and silver plate. The most beautiful are those by Benvenuto Cellini, who died in 1570. In France the art is practised only in one small district of Paris, and chiefly limited to the production of the richly wrought articles of bronze.

ENCKE, JOHANN FRANZ, a German astronomer, born at Hamburg, Sept. 23, 1791. His father, a clergyman, educated him at home until he was sent to the university of Göttingen. In 1813 and 1814 he served in the Hanseatic legion against Napoleon, and in 1815 he entered the Prussian military service, but afterward accepted a situation in the observatory of Seeberg, near Gotha. In 1825 he was appointed director of the royal observatory at Berlin, and has ever since remained in charge of this institution. He is the author of many valuable memoirs on astronomical subjects, of which the most interesting and important are the treatises published in the *Astronomische Nachrichten*, at Berlin, in 1831 and 1832, upon the comet then called by the name of Pons, the astronomer of Marseilles, who discovered it in Nov. 1818, but now known as the comet of Encke. Since its discovery Encke had diligently applied himself to the determination of its orbit. Making use of the methods of his former instructor, Prof. Gauss, as explained in his work *Theoria Motus Corporum Cœlestium*, of calculating an orbit assumed to be elliptical, he showed that its period of recurrence must be about 3¼ years, and that it was probably the same comet observed by Mechain in 1786, by Miss Herschel in 1795, and by Pons in 1805. He calculated the effects of the perturbations it would experience from the planetary bodies, especially from Jupiter, and predicted its return in 1822, though it would probably not be visible in Europe. On June 3 of that year it was discovered at the observatory of Sir Thomas Brisbane, governor of New South Wales. He predicted its return in 1825, and with each reappearance as predicted more elements were afforded for computing its exact orbit. It appeared again Oct. 30, 1828, and Encke was able to fix its orbit as within that of Jupiter, its greatest distance from the sun being 4 times the earth's distance, and its least distance but ⅓ that of the earth, and its period of revolution 3.29 years. By comparison of the times of its earlier and later apparitions, Encke was afterward led to detect a gradual acceleration of its movement, amounting to about 2½ hours on each revolution. This secular acceleration, never before recognized in the movement of any other celestial body, Encke ascribed to a resisting medium, which sensibly affects a body of the extreme rarity of this comet, which is transparent to its centre, but has no perceptible effect upon the denser planetary bodies. Resistance shortens the time of the revolution by giving greater effect to the attraction of the sun, which then draws the body more forcibly toward itself, lessening the major axis of the ellipse and thus its orbit of revolution. In investigating the perturbing effects of the planets upon this comet, of Jupiter in its aphelion, and of Mercury in its perihelion, he was led to suspect that the mass of the former had been greatly underrated (a fact afterward established by Prof. Airy); and in 1838 Encke proved that Lagrange had ascribed nearly 3 times too great a bulk to Mercury. Encke's explanation of the cause of the acceleration is not universally accepted, though the fact itself is not questioned. Bessel particularly opposed the explanation; by the English astronomers it is more favorably received. Beside these investigations, Encke has improved the theory of Vesta, and published a new method of computing perturbations, especially for orbits considerably elliptical. The planet Neptune was discovered at his observatory by M. Galle, his assistant. Since 1830 Encke has annually published the "Astronomical Year Book," and since 1840 "Astronomical Observations made at the Royal Observatory at Berlin." In 1845 he published dissertations *De Formulis Dioptricis;* and in 1846 a treatise "On the Relation of Astronomy to the other Sciences."

ENCRINITE (Gr. κρινον, a lily), a fossil genus of the family *crinoidea* and class *echinodermata*. It appeared among the earliest forms of animal life, its remains being preserved in the rocks of the silurian period. In succeeding formations, nearly to the lias, they are often so

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abundant that calcareous strata extending over many miles are in great part made up of them. As described by Mr. Miller in his work on the crinoidea, the animals of this family are furnished "with a round, oval, or angular column composed of numerous articulating joints, supporting at its summit a series of plates or joints, which form a cup-like body containing the viscera, from whose upper rim proceed 5 articulated arms, dividing into tentaculated fingers more or less numerous surrounding the aperture of the mouth." In the encrinite the stem is cylindrical; in the kindred genus pentacrinite it is five-sided. The cup-like body is the portion representing the flower of the lily, for which the creature is named. When the tentacula are spread out, the appearance is that of an opened flower; when closed, they represent the unopened bud. The stem served to attach the animal to any bodies in the water, and by the manner of articulation of the plates composing it, it admitted of much motion, swaying back and forth. By this means the head with its tentacula was brought within reach of its prey. The plates of the stem, separating into short cylinders, present the form in which the remains of this animal are most commonly seen. In the marbles used for chimney pieces they are often very abundant, the polished surface presenting some of them of a different color from the ground in longitudinal section, some in oblique conical formed cutting, and some in circular disks, being transverse sections across the cylinder. By the disintegration of the rock containing them, the little joints of the fossil stem frequently fall out, and may be gathered in great numbers. Each has a hole through its centre, admitting of their being strung together. Dr. Mantell states that he has found them preserved in tumuli of the ancient Britons, having evidently been worn by them as ornaments. In the north of England they are called "wheel stones" and "St. Cuthbert's beads," and were formerly used as rosaries. The encrinites are remarkable for the multiplicity of small calcareous pieces, which make up the various parts of the animal—the stem, the parts that may be called the 10 arms, the hands and fingers, and the numerous tentacula which proceed from them all. These pieces, as enumerated by Parkinson in his "Organic Remains," amount to not less than 26,000, thus showing a complexity of structure equal to any that is met with in the nearest living analogues of these ancient animals. The structure of one of the fossil pentacrinites (a genus which began to abound as the encrinite disappeared, and has been represented in some of its species down to the present time from the lias, or indeed in a single species from epochs much more remote), has been cited by Dr. Buckland as "showing an equal degree of perfection, and a more elaborate combination of analogous organs than occurs in any other fossil species of more recent date, or in its living representative." The species thus cited is the Briarean pentacrinite of the lias. The living species is the *pentacrinus caput medusæ*, almost the only living analogue of the ancient crinoidea. As Dr. Buckland remarks, the primeval perfection of the fossil affords an example at variance with the doctrine of the progression of animal life from simple rudiments, through a series of gradually improving and more perfect forms, to its fullest development in existing species.

ENCYCLOPÆDIA. See CYCLOPÆDIA.

ENDEMIC DISEASES (Gr. *ἐν*, in or among, and *δημος*, people) are diseases produced by local causes, generally persistent and appreciable, and consequently peculiar to certain climates and localities, during the whole year or at fixed seasons; in the last respect they differ from epidemic diseases, which prevail more or less extensively from accidental, temporary, and generally inappreciable causes. As examples of endemic diseases may be mentioned the cholera of India, the yellow fever of the southern United States, the intermittent fevers of the western states and other marshy districts, the coast fevers of western Africa and Central America, the bronchocele and cretinism of the Alpine valleys, the periodic dysenteries of the East Indies, the yaws of the West Indies, and perhaps the elephantiasis of the blacks in Brazil. Many exanthematous and catarrhal diseases, ordinarily attacking single or few individuals in a community, under the influence of certain ill-understood atmospheric, telluric, or electric conditions, may become epidemic, and affect many persons at a time; the cholera, endemic in India, has raged as an epidemic in Europe and America; and the history of diseases exhibits the occurrence of various epidemics before unknown, appearing without evident cause, defying all treatment, spontaneously disappearing, and not returning afterward. Endemics and epidemics may or may not be contagious (including under that term infection, which amounts practically to nearly the same thing); the endemic dysentery of India, the typhus fever of certain localities, the ophthalmia of Egypt, under favorable conditions, become contagious; the same is true of epidemics of the eruptive fevers, erysipelas, and puerperal fever. The investigation of the causes of endemics and epidemics is one of the most difficult as well as the most important duties of the physician; the lives of thousands may be endangered or saved by the neglect or adoption of proper sanitary, hygienic, and therapeutic treatment; the temperature, electric, hygrometric, and chemical constitution of the air, the elevation and nature of the soil, and the food and habits of the people, are principally concerned in the origin of endemic diseases.

ENDICOTT, JOHN, governor of Massachusetts, born in Dorchester, England, in 1589, died in Boston, Mass., March 15, 1665. He was sent out to this country by the "Massachusetts Company" to carry on the plantation at Naumkeag, or Salem, where he arrived Sept. 6, 1628. In April, 1629, he was chosen governor of "London's plantation;" but in August it was determined to transfer the charter and government of the

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colony to New England, and Winthrop was appointed governor. In 1636, with the famous Capt. Underhill, he conducted the sanguinary but ineffectual expedition against the Block Island and Pequot Indians. Endicott was deputy governor of the Massachusetts colony from 1641 to 1644, in 1650, and 1654; and was governor in 1644 and 1649, from 1651 to 1654, and from 1655 to 1665. He was bold and energetic, a sincere and zealous Puritan, rigid in his principles, and severe in the execution of the laws against those who differed from the religion of the colony. So averse was he to every thing like popery that he cut out the cross from the military standard. He was opposed to long hair, insisted that the women should wear veils in public assemblies, and did all in his power to establish what he deemed a pure church. In 1659, during his administration, 4 Quakers were put to death in Boston.

ENDLICHER, Stephan Ladislaus, a distinguished botanist and linguist, born in Pressburg, Hungary, June 24, 1804, died in Vienna, March 28, 1849. After having received the degree of doctor of philosophy from the university of Pesth, he entered the archiepiscopal seminary of Vienna in 1823, mainly with a view to the study of oriental languages, which he pursued for some years with success. He received the minor clerical orders, but in 1827 resolved to abandon theology for the natural sciences, and especially botany, without, however, giving up his linguistic pursuits. In 1828 he was appointed director of the imperial library of Vienna, in 1836 keeper of the court cabinet of natural history, and in 1840 professor of botany and director of the botanic garden of the university. In his zealous promotion of his favorite studies he soon exhausted the considerable resources which he had inherited from his father. Books, maps, types, seeds, plants, herbaria, and all other materials which were yet wanting at Vienna, and which the government was not liberal enough to procure, he purchased at his own expense. He published the most superbly illustrated works, which owing to their costliness and scientific character found but few purchasers; he even aided others in publishing their works, and gave away whole editions of his own. His map of China, in 24 sheets, may be cited as a specimen of his prodigality. He presented his own choice library and rich herbaria to the state, and distributed rare Asiatic printing types to public institutions. He was equally original and profound in botany and philology. He corresponded with the most eminent savants in every part of the world, and was one of the chief founders of the academy of Vienna, and one of the originators of the *Annalen des Wiener Museums*. He rendered valuable services to the state, for which he received no remuneration, and for 10 years was a constant companion of the emperor Ferdinand V., with whom he used to pass several hours every week. For all this he was rewarded with the paltry title of *Regierungsrath*, and had the mortification of seeing the orientalist Joseph von Hammer-Purgstall nominated to the presidency of the academy, an honor to which Endlicher was at least as well entitled. The political turmoils of 1848 placed Endlicher in a precarious position; his sympathies and principles were those of the popular party, while his associations and pursuits bound him to the aristocracy and the conservatives. The untoward turn of political affairs, his pecuniary embarrassments, and the intrigues of enemies drove him to despair, and he died of a broken heart, or as some believe by his own hand.—His works, most of which were published in Vienna, are astonishing for their variety, and are written with equal learning, elegance, and clearness. Those on subjects not connected with botany are: *Examen Criticum Codicis IV. Evangeliorum Byzantino-Corviniani* (Leipsic, 1825); *Anonymi Belæ Regis Notarii de Gestis Hungarorum Liber* (1827); *Prisciani de Laude Imperatoris Anastasii, et de Ponderibus et Mensuris Carmina* (Vienna, 1828); *Fragmenta Theotisca Versionis Antiquissimæ Evangelii Matthæi et aliquot Homiliarum* (edited with Hoffmann von Fallersleben, 1834); *Vom Bruder Rauchen* (with F. Wolf, 1835); *De Ulpiani Institutionum Fragmento, etc.* (1835); *Catalogus Codicum Manuscriptorum Bibliothecæ Palatinæ Vindobonensis* (1836); *Analecta Grammatica* (with Dr. J. von Eichenfeld, 1836); *Verzeichniss der Chinesischen und Japanesischen Münzen des Münz- und Antiken-Cabinets in Wien* (1837); *Anfangsgründe der Chinesischen Grammatik* (1845); *Die Gesetze des heiligen Stephan* (1849); *Rerum Hungaricarum Monumenta Arpadiana* (St. Gall, 1849).—His botanical works are: *Ceratotheca, eine neue Pflanzengattung aus der Ordnung der Sesameæ* (Berlin, 1822); *Flora Posoniensis* (Pesth, 1830); *Stirpium Pemptas; Meletemata Botanica* (with H. Schott, Vienna, 1832); *Diesingia, Novum Genus Plantarum* (1832); *Prodromus Floræ Norfolkicæ, etc.* (Vienna, 1833); "Miscellaneous Works of Robert Brown," edited in connection with Nees von Esenbeck; *Atacta Botanica, Nova Genera et Species Plantarum* (1833); *Nova Genera et Species Plantarum in Regno Chilensi Lectarum* (with Pöppig, Leipsic, 1835); *Sertum Cabulicum inter Dera Ghazee Khan et Cabul* (with Edward Fenzl, 1836); *Genera Plantarum secundum Ordines Naturales disposita; accedit Supplementum Primum* (1836–'40; one of the most important systematic works yet published); *Enumeratio Plantarum quas in Novæ Hollandiæ Ora Austro-Occidentali ad Fluvium Cygnorum et in Sinu Regis Georgii, collegit C. L. B. de Hügel* (with George Bentham, E. Fenzl, and H. Schott, 1837); *Iconographia Generum Plantarum* (1838); *Grundzüge einer neuen Theorie der Pflanzenzeugung* (1838); *Stirpium Australasicarum Herbarii Hügeliani Decades tres* (1838); *Stirpium Novarum Decades* (1839); *Flora Brasiliensis, etc.* (with Ch. Fr. and Phil. von Martius, Vienna and Leipsic, 1840–'46);

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Enchiridion Botanicum, etc. (Leipsic, 1841); *Die Medicinalpflanzen der östreichischen Pharmakopöie* (1842); *Catalogus Horti Academici Vindobonensis* (1842–'3); *Mantissa Botanica, sistens Genera Plantarum Supplementa Secundum et Tertium* (1843); *Grundzüge der Botanik* (with Franz Unger, 1843); *Synopsis Coniferarum Sancti Galli* (1847); *Paradisus Vindobonensis* (with Hartinger, 1847); and many minor works in the *Annalen des Wiener Museums*, and in other periodicals. (See also BOTANY, and CHINESE LANGUAGE.)

ENDOGENS (Gr. ἔνδον, within, and γεννάω, to generate), a class of plants so called because their stems increase in diameter by the deposition of new woody matter in the centre, in contradistinction to exogens, whose stems increase by the formation of a new layer of wood outside of that previously formed, and immediately beneath the bark. In endogens the stem has no medullary rays, concentric rings, or apparent distinction of pith, wood, and bark, but consists of fibres of woody or vascular tissue, distributed with little apparent regularity through the cellular system of the stem. They may be traced from the base of the leaves downward, some passing into the roots, and others curving outward until they lose themselves in the rind or cortical integument, which differs from the bark of exogens in that it does not increase by layers, and cannot be separated from the wood. As the plant grows, new threads or fibres spring from the freshly formed leaves, and passing first down the centre of the stem crowd the old ones out, and are finally directed toward the rind. In some plants the rind, being soft, is capable of unlimited distention; in others it soon indurates, and the stem consequently ceases to grow in diameter. The best example of this class of plants is the palm, whose branchless trunk, rising from 30 to 150 feet from the ground, and terminated by a simple cluster of foliage, has a striking and majestic appearance. The growth of this tree is from the terminal bud, and if the bud is destroyed the tree perishes. In some instances, as in the doum palm of Upper Egypt, and the pandanus or screw pine, two terminal buds appear and branches then shoot forth. The asparagus is an example of endogenous growth. Endogens are monocotyledonous; the veins of their leaves are almost uniformly in parallel lines connected by simple transverse bars; their flowers are trimerous, or have their sepals, petals, stamens, and styles in threes. They luxuriate in hot and humid climates, and they comprise the greater number of plants contributing to the food of man, and but a small proportion of poisonous plants. They are generally shorter lived than exogens, though the dragon tree and others, whose growth is not limited by the hardening of the cortical integument of the stem, may attain a great age. The average age of the palms is perhaps 200 or 300 years.

ENDOR (Heb. home-fountain), a town of Palestine, assigned to the tribe of Manasseh, situated on this side of the Jordan, to the south of Nain. It was in a solitary valley, not far from this town, that the famous sorceress resided, whom Saul went to consult on the evening before the fatal battle of Gilboa.

ENDOSMOSE (Gr. ἔνδον, within, and ὠσμος, impulsion), the action exhibited by one of two fluids of different densities and composition in passing through a porous membrane which separates them, till they become both of the same density. Let a solution of sugar in a tube closed below with a slip of bladder tied across the end, and open above, be suspended in a vessel of water. The quantity of liquid in the tube is soon seen to increase by the passing through of the thinner fluid. It will flow over and run down into the outer vessel, and so the action will go on till the two mixtures become uniform. Dutrochet, who first observed this phenomenon, found that the height to which the fluid would rise increased with the density of the thicker fluid. In a tube about 1¼ inches diameter and sirup of density 1.083, the fluid rose more than 1½ inches in 1½ hours; with sirup of a density of 1.145 the fluid rose nearly 8 inches; and when the density was 1.228 the rise was 4 inches. A considerable force is exerted in this movement; in sirup of density 1.3 Dutrochet estimated it to be equal to the pressure of 4½ atmospheres. If the flow is drawn inward, the action is called endosmose; if in an outward direction, it is called exosmose. It is supposed to be upon this principle that the sap ascends in trees and fluids are diffused through animal bodies. Liebig, after describing some experiments, in which fluids were made to pass through as many as 9 membranes, to fill the vacant space left by evaporation of another fluid in a glass tube, remarks with reference to the application of the results to the processes taking place in the animal body as follows: "The surface of the body is the membrane, from which evaporation goes constantly forward. In consequence of this evaporation, all the fluids of the body, in obedience to atmospheric pressure, experience motion in the direction toward the evaporating surface. This is obviously the chief cause of the passage of the nutritious fluids through the walls of the blood vessels, and the cause of their distribution through the body. We know now what important functions the skin (and lungs) fulfil through evaporation. It is a condition of nutrition, and the influence of a moist or dry air upon the health of the body, or of mechanical agitation by walking or running, which increases the perspiration, suggests itself." Interesting examples of this phenomenon are seen in the passage of the gases through membranes. If a tumbler, filled with air and covered at top with a thin sheet of India rubber, is placed under a bell glass filled with hydrogen, the gas will soon penetrate the cover and mix with the air; and this action will go on till the India rubber bursts open from the increased bulk of the contents of the tumbler. If the tumbler contained hydro-

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gen and the bell glass air, the India rubber would then be pressed in by the escape of the gas, leaving the portion remaining of greatly reduced density.

ENDYMION, in ancient mythology, a shepherd of remarkable beauty, who, according to a Greek legend, retired every night to a grotto of Mount Latmus in Caria. As he slept the goddess Selene (the moon) became enamored of him, and leaving her chariot came down to him. The eclipses of the moon were attributed to these visits. By Selene he had 50 daughters. Jupiter condemned him to perpetual sleep, or, according to other accounts, to 50 years of sleep.

ENFANTIN, Barthélemy Prosper, generally known under the name of Père Enfantin, one of the founders of St. Simonism, born in Paris, Feb. 8, 1796. He was the son of a banker, and with his fellow pupils was dismissed from the polytechnic school after March 30, 1814, for having fired on that day on the allied troops. He then became a commercial traveller, and in 1821 member of a mercantile firm in St. Petersburg. He returned to France in 1823, and was converted to the theory of St. Simon by a Jew named Olinde Rodrigues, who had been one of his teachers. After the death of St. Simon, May 19, 1825, Enfantin and Rodrigues began the publication of a journal (*Le producteur*), which was discontinued toward the end of 1826; many persons, who had given their support to it while its discussions were confined to social and industrial interests, having withdrawn as soon as Enfantin assumed the character of a religious innovator, and especially as soon as he was denounced as such by Benjamin Constant. Enfantin, however, continued to advocate his views by lectures and public meetings. The revolution of 1830 favored the movement, which was soon formally organized with Enfantin and Bazard as the chief leaders (*pères suprêmes*), and with the *Globe* newspaper, of which Michel Chevalier was editor, as its organ. A schism, however, soon broke out between the two leaders. Enfantin was a bachelor and a sentimentalist. He divided mankind into two classes, the impulsive and the thoughtful, the former governed solely by transient sentiments and effects, the latter always by abiding principles. In order to harmonize the personal relations between these two classes, he proposed the overthrow of all legislative and social restraint in the sphere of love and affection, and would admit of no other interference with the impulses and emotions of the individual but that of the priest or confessor, who should have full command over the body and soul of his disciples for the purpose of enabling him to control their passions. But in his opinion the priest ought to be a person of great personal attraction, and woman, as a conspicuous representative of the impulsive class of human beings, should take a prominent part in the new movement. Bazard, who was a married man, a person of character and principle, protested against these views, and opposed Enfantin's attempt to convert St. Simon's economical doctrines into a religious creed. He charged him and his followers with planning a social order founded upon licentiousness; separated from them in 1831, and died a year afterward. His secession was followed by that of the economical and political section of the school. Enfantin, however, persisted in his endeavors to establish a new religion. He addressed his followers (whom he estimated at 40,000 in France alone) with the authority of a superior being set apart by Providence for the purpose of inaugurating a new era for humanity through the emancipation and the agency of woman. He endeavored to find the female Messiah (*femme Messie*) who in his opinion was predestined to bear to him a new saviour of mankind. He enjoined on all his adherents in the different parts of France to aid him in his search for this female; and although his singular theories were attacked by many of his old associates, he continued to make proselytes, the number of his publications increased rapidly, and he sent agents to the principal cities of Europe. He gave splendid entertainments at Paris, which are said to have cost him over $50,000, in which the purpose of discovering among the women present the long-sought individual was never lost sight of. He procured a loan of $16,000 for the establishment of industrial workshops, but this amount was not sufficient. They were soon closed, and the *Globe* newspaper was also discontinued for want of funds. The attention of the authorities being at length drawn to his meetings, they were closed in May, 1832. He now withdrew with 40 of his followers, among whom were Michel Chevalier and other eminent men, to the neighborhood of Paris, near Ménilmontant. Here, upon some land which belonged to him, they established a community and spent their time in manual labor and St. Simonian religious ministrations, over which Enfantin presided. Again arraigned by the government, Enfantin appeared in the court with two ladies (Cécile Fournel and Aglaé Saint Hilaire) as his counsel; but they were not permitted to plead his cause. The trial lasted 2 days (Aug. 27 and 28, 1832). He was found guilty, and sentenced to a year's imprisonment, but set free after a few months' detention. He subsequently spent 2 years in Egypt, after which he returned to France, devoting himself to agricultural pursuits and officiating as a postmaster near Lyons. By the influence of his former disciples and associates he became in 1841 a member of the scientific board for Algeria. From 1845 to 1848 he was director of the new railway line between Paris and Lyons. In Nov. 1848 he established, in concert with M. Duveyrier, a daily journal, *Le crédit*, with a view of reconciling political reforms with his Utopian views of social relations; but the journal was discontinued in 1850. He again received an appointment in connection with the administration of railways, which he still holds. Among his principal works is *Doctrine de Saint Simon*, which was the joint production of himself and of Carnot, Fournel, Du-

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veyrier, Bazard, and Abel Transon. It passed through 4 editions from 1830 to 1832, and a new edition appeared in 1854. In his latest work, "Knowledge of Man and Religious Physiology" (Paris, 1859), he still maintains his peculiar religious and social theories.

ENFIELD, a market town of Middlesex, England, on the London and Cambridge railway, 10 m. N. E. from London; pop. in 1851, 9,453. It is noted as the seat of an ancient palace, now half ruined, built in the time of Henry VII., and of the manufactory of the well-known rifles which take their name from this place. The manufactory employs 1,300 hands, and turns out weekly 1,100 stands of arms. The term "Enfield rifle" does not denote any particular improvement, but the result of a series of improvements on the old musket. The guns are made by machinery after the American system, which a commission was sent out by the British government to examine about 1851.

ENFIELD, WILLIAM, an English theologian, born in Sudbury, March 29, 1741, died in Norwich, Nov. 3, 1797. He was a dissenter, and in 1763 was chosen pastor of a congregation in Liverpool, where he remained 7 years, and published some devotional works and 2 volumes of sermons. In 1770 he was elected to the professorship of belles-lettres in the academy at Warrington, remained in this position till the dissolution of the academy in 1783, and was subsequently pastor in Norwich. His biographical sermons and biblical characters are not only valuable as aids to interpretation, but exhibit considerable force of thought and elegance of expression. He published an abridgment of Brucker's "History of Philosophy," and a work entitled "Institutes of Natural Philosophy," and wrote under the signature of X. many articles in Aikin's "Biographical Dictionary." He was also the compiler of "Enfield's Speaker," a very popular collection of pieces for reading and reciting in schools.

ENFILADE (Fr. *enfiler*), in military affairs, a trench or position which may be scoured with shot through the whole length of its line. A trench or parapet is said to be enfiladed when the guns of the enemy can be fired into it in a direction parallel to its length.

ENGADINE, or ENGADIN, or Valley of the Inn, a beautiful valley of Switzerland, situated near the sources of the Inn, at an altitude varying from 3,500 to 6,100 feet above the level of the sea, and extending along the banks of the Inn, through the canton of the Grisons, between two principal chains of the Rhætian Alps, from the Maloia, which separates it from the picturesque valley of Brigell, to the gorge of Finstermüntz, on the confines of the Tyrol; length, about 45 m.; average breadth between 1 and 2 m.; pop. estimated at 11,000, chiefly Protestants. The tops of the surrounding mountains are inaccessible rocks, and the sides are sometimes covered with glaciers. The valley and the lower part of the mountains are susceptible of cultivation, but are for the most part occupied by forests or used for pasture lands. The valley was for some time subject to Austria, which lost it in 1623. Most of the male population emigrate at an early age and scatter themselves over all parts of the continent. Some of the higher Alpine pastures of the valley are let every summer to Italian shepherds. The natives speak a peculiar dialect called *Romansh*.

ENGANO, an island of the Malay archipelago, 60 m. S. of Sumatra, in lat. 5° 21′ S. and long. 102° 20′ E. It is about 30 m. in circuit, of a triangular form, thickly covered with forests, and surrounded by coral reefs. With some small islands adjacent, it has an area of 400 sq. m. The natives, who are genuine Malays, live in conical houses, have neither cattle nor fowls, and seem to subsist wholly on cocoanuts, sugar cane, bananas, and fish. Unsuccessful attempts have been made by the English and Dutch to open an intercourse with these islanders. On the S. E. side of the island there is a safe harbor, formed by a bay protected from the sea by 4 small islands.

ENGHIEN, LOUIS ANTOINE HENRI DE BOURBON, duke of, a French prince, of the Condé family, born in Chantilly, Aug. 2, 1772, executed at Vincennes, March 21, 1804. He received an excellent education, served under his grandfather, Prince Louis Joseph, in the outbreak of the revolution in 1789, and accompanied his father and grandfather into exile. He bore arms against revolutionary France in the famous corps of royalist emigrants commanded by his grandfather, and distinguished himself both by bravery and humanity to his prisoners. On the disbanding of the corps, in 1801, he fixed his residence at a chateau near Ettenheim, in Baden, being impelled to that choice, it is said, by his affection for the princess Charlotte de Rohan, who lived in Ettenheim, and to whom he was perhaps secretly married. Though it does not appear that he took part in any subsequent plots against the French consul, he was generally looked upon as a leader of the *émigrés*, and was suspected of complicity in the attempt of Cadoudal to take Bonaparte's life. The reports of spies sent to watch his movements gave some color to these surmises, for it appeared that he was frequently absent for 10 or 12 days together, at which time it was supposed that he secretly visited Paris. It was thought that an unknown person, apparently of rank, who had been seen to visit Cadoudal at Paris, but who afterward proved to be Pichegru, could be none other than the young duke. Anxious to terrify the royalists by a decisive blow, and to put a stop to their attempts upon his life, Napoleon resolved to seize and execute the duke, and accordingly sent Gen. Ordener with 300 gendarmes to make the capture. The soldiers surrounded the chateau on the night of March 15, 1804, arrested the duke in his bed, and conducted him immediately to Strasbourg, whence he was removed on the 18th to the fortress of Vincennes. He had received warning of his danger from Talleyrand and from the

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king of Sweden, through his minister at Carlsruhe, but his escape had been prevented by the delay of the Austrian authorities in forwarding a passport. The prisoner reached Vincennes on the evening of the 20th, and a few hours afterward a court-martial, presided over by Gen. Hullin, assembled in the fortress. A mock trial was gone through, and, without the examination of witnesses or written testimony, the duke was found guilty on various charges of treason, and at once led out to execution. His requests to see the first consul and to be allowed a confessor were both denied. He was shot by torchlight between 4 and 5 o'clock A. M., in the ditch outside the walls, and his body was thrown, dressed as it was, into a grave which had been dug the day before. This tragical end of a young, brave, and amiable prince excited a feeling of horror throughout Europe, though it had its intended effect in putting a stop to plots like those of Cadoudal. Napoleon and his chief instruments took every pains to justify their conduct, and it has never been known who of them was most guilty.

ENGINEERING (Fr. *engin*, an engine), a term applied chiefly to the profession the object of which is the construction of canals, railroads, bridges, aqueducts, and similar works. Those are also called engineers who construct and direct the operation of large engines. Those devoted to the planning and building of fortifications and structures for warlike uses are called military engineers. The title of civil engineer (C.E.) is given to those who are educated to the civil branch of the profession. In France the profession is more strictly divided than elsewhere into many departments. Those engaged upon the public surveys in the interior are called *ingénieurs géographes;* on the coast, *ingénieurs d'hydrographie;* in maritime works and naval architecture, *ingénieurs de la marine;* and civil engineers are *ingénieurs des mines*, or *des ponts et chaussées*. There is also the corps of military engineers, made up of those educated at the *école d'artillerie et du génie*. In the United States the graduates of the military school at West Point are qualified as military engineers, and are also instructed in the principles of the other departments of the profession. The title of civil engineer is legally conferred by the polytechnic school at Troy, N. Y., upon its graduates. In England the institution of civil engineers was established at London in 1828, and the publication of its "Transactions" has served a most useful purpose in disseminating the new data relating to the objects of the profession which are constantly accumulating.—The works of the ancient Egyptians and of some ruder nations indicate surprising acquirements in some departments of the science of engineering. This is exhibited in the moving and raising of the enormous blocks of stone employed in the construction of the architectural monuments of Egypt and of Baalbec in Syria. The canals of the Chinese and aqueducts of the ancient Peruvians are also triumphs of engineering skill. The works ascribed to Archimedes, undertaken in defence of Syracuse against the Romans in the 2d Punic war, as also his inventions and original demonstrations in mechanical science, entitle him to a high rank as an engineer. Vitruvius was a celebrated engineer, appointed by Augustus to the office of superintending and improving the military engines, and further distinguished as an architectural writer by his treatise (*De Architectura*) upon the building of walls, fortifications, temples, theatres, various hydraulic engines, mills, &c. During the middle ages, and indeed up to the time of the introduction of steam engines, the principal great engineering works, beside the hydraulic operations of the Dutch and the canals constructed in the north of Italy, were in the architectural branch of the profession; and of these the finest examples are the domes of the great churches, as that of St. Mary at Florence, by Brunelleschi; of St. Peter's at Rome, by Peruzzi, San Gallo, and Michel Angelo; and of St. Paul's at London, by Sir Christopher Wren. The introduction of the steam engine, and the great extension of manufactures consequent thereon, opened new fields for the operations of the engineer; and in England particularly the art in its various departments attained a high degree of perfection, exemplified in the numerous admirable canals and railways, the Eddystone lighthouse, the Menai straits bridge, the breakwater at Plymouth, and various other works. One of the most wonderful of these is the bridge across the Tamar, uniting the counties of Devon and Cornwall, constructed by the celebrated engineer Mr. Brunel, and opened in April, 1859; an account of which, too late for the article BRIDGE, may conveniently be introduced to conclude the present subject. The bridge, named the Albert viaduct, crosses the Tamar at Saltash, a little above Plymouth, where the estuary is contracted to a width of 910 feet. From point to point on the hills at either side, at the required level of the bridge, the distance is 2,240 feet. This level is 100 feet above the water in order that the bridge shall present no obstruction to the large ships that pass up and down the estuary. Double stone piers 11 feet square, and 17 in number on either side, and varying with the slope of the ground from 20 to 100 feet in height, support the bridge over the margins of the river. To span the river itself without impediment to its navigation was the great difficulty to be overcome. In the middle the water was 70 feet deep, and the bottom was mud and gravel extending 20 feet further down. Here Mr. Brunel caused a cylinder of wrought iron, 37 feet in diameter and 100 feet high, weighing 300 tons, to be sunk upright. The water being expelled by forcing in air under sufficient pressure, the materials at bottom were removed by men working within down to a solid rock foundation; and upon this the central pier of masonry was raised above the surface, the width of this at top being 30 feet. Two tubes of boiler plate iron in arch form

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were made ready upon the land to be laid across these openings, each to have one foot upon the pier in the river and one upon the pier on either bank. Each measured 470 feet in length, 17 feet in width, and 12 feet in height; and with the chains to be suspended from it for supporting the roadway, the weight of each exceeded 1,200 tons. Its strength was tested by a weight of 1,200 tons distributed over the whole arch, the effect of which was only to cause a temporary deflection of 7 inches. The tubes, being floated out upon iron pontoons and brought to their places, were raised by hydraulic pressure, the methods employed resembling those adopted for floating and elevating the Britannia tubular bridge. Twice every week the spans were raised 3 feet in one day; and in the intervals the masonry on the land side was built up to support the outer end. The ends in the middle of the river were sustained by temporary blocking each time they were raised, until a height of 14 feet was attained, which admitted the insertion of one of the joints of this length of the great cast iron columns, 4 of which supported these ends. When the arched tubes were raised to the height required, the chains for supporting the roadway were attached, and the work was then soon completed. To stiffen the structure, the parts were strongly bound together with cross ties of wrought iron. The quantity of this metal employed in the work was about 2,650 tons, beside 1,200 tons of cast iron. There were also used about 14,000 cubic feet of timber and 459,000 cubic feet of masonry. When finished, the bridge was tested by a train weighing 400 tons, crossing and recrossing at various speeds. The greatest deflection observed did not exceed 1¼ inches. The appearance is said to be tasteful and elegant, though the only object in view was strength and stability. In naval engineering, also, England was preëminent in the construction of the largest ships.— The engineering works of the United States are exhibited in its long lines of railroad, so constructed as to stretch at the least cost over vast and thinly populated areas; in its canals, its dry docks, fortifications, and breakwaters; and more especially in ship-building, which, however, in the United States is not ordinarily treated as a branch of engineering.

ENGLAND (Lat. *Anglia*; Fr. *Angleterre*), a country of Europe, forming with Wales the southern, larger and more important division of the island of Great Britain, and the principal member of the United Kingdom of Great Britain and Ireland; bounded N. by Scotland, E. by the German ocean, S. by the straits of Dover and the English channel, separating it from France by distances increasing westward from 21 m. to 100 m., S.W. by the Atlantic, and W. by St. George's channel and the Irish sea, dividing it from Ireland, and having an average width of about 90 m. It lies between lat. 49° 57′ 42″ and 55° 46′ N., long. 1° 46′ E. and 5° 42′W.; its greatest length N. and S. is 400 m., and its greatest breadth 280 m. Its shape bears some resemblance to a triangle, the apex being at Berwick-on-Tweed, the northernmost point in England, and the extremities of the base at the South Foreland, near Dover, and the Land's End, at the S. W. point of Cornwall. The distance in a direct line from Berwick to the South Foreland is 345 m.; from the South Foreland to the Land's End, 317 m.; and from the Land's End to Berwick, 425 m.; making a total perimeter of 1,087 m., but following the sinuosities of the coast the perimeter will be about 2,000 m. The area of England is 32,590,429 statute acres, or 50,922 sq. m.; that of Wales is 4,734,486 acres, or 7,398 sq. m. The divisions of England are very ancient, the counties being substantially the same now as they were 10 centuries ago, though a few have been made in later times. Each county is subdivided into hundreds, and the hundreds into parishes. London is the metropolis of the United Kingdom, and the other principal places are Liverpool, Manchester, Birmingham, Leeds, Bristol, Sheffield, Bradford, Hull, Southampton, &c. The following table shows the population of the counties in 1841 and 1851, number of inhabitants to the square mile, and county towns:

Counties.	Population.			County towns.
	1841.	1851.	Per sq. m.	
Bedford	107,936	124,478	289	Bedford.
Berks	161,750	170,065	241	Reading.
Buckingham	156,489	165,733	224	Aylesbury.
Cambridge	164,459	183,405	226	Cambridge.
Cheshire	395,660	453,735	412	Chester.
Cornwall	342,159	355,558	260	Bodmin.
Cumberland	178,038	195,492	125	Carlisle.
Derby	272,202	296,054	288	Derby.
Devon	582,959	567,098	215	Exeter.
Dorset	175,054	184,207	186	Dorchester.
Durham	307,963	390,997	399	Durham.
Essex	344,979	369,315	222	Chelmsford.
Gloucester	431,495	458,805	364	Gloucester.
Hereford	115,273	115,459	138	Hereford.
Hertford	156,660	167,299	274	Hertford.
Huntingdon	58,349	64,163	178	Huntingdon.
Kent	549,353	615,766	375	Canterbury.
Lancaster	1,667,054	2,031,236	1,064	Lancaster.
Leicester	215,867	230,308	287	Leicester.
Lincoln	362,092	407,222	146	Lincoln.
Middlesex	1,576,636	1,886,576	6,683	Brentford.
Monmouth	134,866	157,418	273	Monmouth.
Norfolk	412,664	442,714	309	Norwich.
Northampton	199,228	212,380	216	Northampton.
Northumberland	266,020	303,568	154	Newcastle-upon-Tyne.
Nottingham	249,910	270,427	329	Nottingham.
Oxford	163,127	170,439	231	Oxford.
Rutland	21,302	22,993	154	Oakham.
Salop (Shropshire)	225,920	229,241	178	Shrewsbury.
Somerset	435,599	443,916	271	Bath.
Southampton (Hants, Hampshire)	354,693	405,370	240	Winchester.
Stafford	509,472	608,716	585	Stafford.
Suffolk	315,078	337,215	223	Ipswich.
Surrey	584,036	683,092	910	Guildford.
Sussex	300,075	336,544	260	Chichester.
Warwick	401,798	475,018	589	Warwick.
Westmoreland	56,454	58,287	77	Appleby.
Wilts	256,280	254,221	188	Salisbury.
Worcester	248,460	276,996	378	Worcester.
York:				
East Riding	194,936	220,983	192	Beverly.
City	28,843	85,808	9,075	York.
North Riding	204,701	215,914	102	Northallerton.
West Riding	1,163,980	1,325,493	496	Ripon.
Total	14,997,497	16,921,888	332	

Wales, which was incorporated with the English

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monarchy in the time of Edward I., is divided into 12 counties, with an aggregate population in 1841 of 911,705, and in 1851 of 1,005,721; average number of inhabitants per sq. m. in 1851, 136. Including the army, naval and merchant marine service, the aggregate population of England and Wales in 1851 was 18,004,551, of whom 8,883,298 were males and 9,121,253 females, and the estimated population, June 30, 1857, was 19,304,000. The number of marriages registered in England during the first 9 months of 1858 was 108,571; number of births during the whole year, 655,627; number of deaths, 450,018, an increase of 29,999 from the previous year. The ratio of mortality would thus be about 1 in 43; in 1780 it was 1 in 40, and 1852 it was estimated at 1 in 56.—The most important rivers of England are the Medway, Thames, Stour, Orwell, Great Ouse, Nene, Welland, Witham, Humber, Trent, Ouse, Tees, Wear, Tyne, and Tweed, all of which empty into the German ocean; the Esk, Eden, Lune, Ribble, Mersey, Dee, Severn, Avon, Taw, and Torridge, which empty on the W. coast; and the Tamar, Exe, Froom, Avon (Hampshire), and Southampton water, which flow into the English channel. Many of these have broad estuaries at their mouths, and are navigable by large vessels. The English lakes, though few in number, are famed for their beauty. The picturesque districts of Westmoreland and Cumberland, in which are Ullswater (9 m. long, and from ¼ to 2 m. wide), Windermere, the largest lake in England (10½ m. long, and from 1 to 2 m. wide), Bassenthwaitewater, Derwentwater, Buttermere, Ennerdalewater, &c., are favorite summer resorts. The sea-coast is much broken, and abounds in fine harbors and roadsteads. On the E. are Herne bay, the estuaries of the Medway, Thames, and Humber, and the Wash, into which empty the Great Ouse, Nene, Witham, &c.; on the W. the broad Solway frith, between England and Scotland, Morecambe bay, the Bristol channel, Bridgewater bay, and the estuaries of the Duddon, Ribble, Mersey, Dee, and Severn; and on the S. Mount's bay, Falmouth harbor, Plymouth sound, Tor bay, the estuary of the Exe, Weymouth bay, Poole harbor, the Solent and Southampton water between Hampshire and the isle of Wight, Portsmouth and Chichester harbors. Near the entrance of Dover strait into the German ocean are the well-known anchorage grounds called the Downs, opposite the towns of Deal and Sandwich. The E. coast presents an alternation of sandy beaches and chalk cliffs, hollowed out in many places into caves, and with several high promontories. The Atlantic tides form a strong current, sweeping S. along this coast, and continually wearing away the limestone cliffs and headlands; the encroachments of the sea have already buried large tracts of land. A submarine forest has been traced along a great part of the coast of Lincolnshire. On the sandy portions of the seaboard the opposite phenomenon is observed; portions of land have here been gained from the water, the town of Norwich, which is now near the centre of the E. division of Norfolk, having stood in the 13th and 14th centuries on an arm of the sea. The S. coast, from the South Foreland to beyond Folkestone, is characterized by lofty chalk cliffs, which are continually diminishing in height. It then gradually subsides into Romney marsh, W. of which the shore becomes alternately precipitous and flat. The W. is by far the most irregular of the English coasts. It is high and rocky as far as Minehead bay on the Bristol channel. North of the principality of Wales the shore consists of wasting cliffs of red clay and marl, of peninsulas which were probably once more elevated than they are now, of abrupt headlands, and toward Solway frith of sands and marshes. The most mountainous part of England lies N. of the rivers Humber and Mersey, and is traversed N. and S. by a range called the Pennine mountains or the northern range, connected with the Cheviot hills on the Scotch border, and terminating in Derbyshire. The general height of its summits is 3,000 to 3,400 feet. This range is about 60 m. long, and of unequal width, varying from a narrow ridge to 20 m. West of it are the Cumbrian mountains, occupying the central and S. portions of Cumberland, the largest part of Westmoreland, and the N. part of Lancashire. Their highest summits are Seafell (3,166), Helvellyn (3,055), Skiddaw (3,022), and Bowfell (2,911). The Devonian range extends from Somersetshire to the Land's End, and its principal elevations are from 1,500 to 1,800 feet high. Three cross ridges occupy the S. E. part of the kingdom, extending from Salisbury Plain, one S. E. to Beachy Head, another E. to the E. shore of Kent, and the third N. E. into Norfolk. The famous South Downs, 50 m. long and 5 or 6 m. wide, are in the first, and the Surrey hills or downs, celebrated like the former for their sheep pastures, are in the second. The Malvern hills extend over parts of the counties of Gloucester, Hereford, and Worcester. The Cotswold and Stroudwater hills are in Gloucester, and the Chiltern hills extend from Hertford into Oxford. Between these ridges lie many beautiful vales, watered by rivers; other parts of the country spread out in vast plains, such as the plain of York, which extends from the valley of the Tees to the confluence of the Ouse and Trent, a distance of 70 or 80 m., and others abound in rugged and picturesque scenery. Northumberland is in a great degree occupied by moors, which also cover much of Lancashire, Yorkshire, Staffordshire, Cumberland, Westmoreland, and Durham. These are elevated tracts, in most places sterile, heath-grown, or gravelly. Those of the East Riding of Yorkshire alone cover an area of 400 or 500 sq. m. The wolds of Yorkshire, which closely resemble the chalk hills of many other counties, occupy about 500 sq. m.—The distribution of the geological formations through England is curiously connected with that of its inhabitants, their industrial pursuits, and physical condition; all which indeed are in great measure controlled by

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the nature of the mineral productions, and of the soil resulting from the disintegration of the rocky strata. Nearly all that portion of England lying E. of a line drawn from the mouth of the Tyne in Northumberland in a southerly direction through the towns of Nottingham and Leicester, thence S. W. nearly to Gloucester, and again S. to Bath, and S. W. to Exmouth, consists of the upper secondary formations, including the oolite, lias, chalk, and greensand; and on both sides of the Thames, widening as the formation extends N. along the coast of Suffolk, is the tertiary group of clays and sands, which constitutes the London basin, and rests in the depression of the chalk. Similar strata hide the secondary rocks over a small area about Southampton and the northern part of the isle of Wight. In Lincolnshire a strip of alluvial skirts the coast, and stretches S., constituting the boggy district of Huntingdonshire and Cambridgeshire. Over this region of secondary rocks the prevailing dip is toward the S. E., so that the lower members of the series are in general met with in passing from the eastern coast westward. They constitute narrow belts, which are traced with great uniformity in their line of bearing, or N. E. and S. W. Thus from Weymouth to the Humber one may continue on that bed of the middle oolite called the Oxford clay, the average thickness of which does not exceed 500 feet. A little further west, from Bridport in Dorsetshire to Flamborough Head on the coast of Yorkshire, the topography, rocks, and soil all designate the chalk formation of earlier date; but west of this, on the line from Lyme Regis to Whitby, the limestones of the lias appears in the general order of older rocks in a westerly direction. Over all this region no mines of coal or of metallic ores are found. The easily disintegrated strata present no bold hills, except in the cliffs of chalk abutting upon the coast, but are spread out in elevated plains, and gentle undulations and hills of smoothly rounded outlines. The calcareous nature of the strata secures fertility to the soil; and the region is distinguished for its agricultural character. West of this, occupying a belt not many miles wide, is the manufacturing district of England, made so by the mines of coal and iron ore which are found along its range. They occur at intervals in isolated basins of moderate area, but remarkably productive in coal by the close grouping together of the beds and the great depths to which they are carried by the steepness of the dip. (See Coal.) These basins are often overlaid in part by the sandstones and marls of the new red sandstone formation, which may be seen resting upon the upturned edges of the strata of the coal formation. The marls afford rock salt and strong brine springs, which have long been advantageously worked in Cheshire, and near Droitwich in Worcestershire. Associated with the salt are also found valuable beds of gypsum. The coal fields are too numerous to be all particularly named. That of Newcastle extends from the N. E. extremity of England to the river Tees, along the coast of Northumberland and Durham; it is traced further S. to Leeds, but this portion has only the lowest beds, which are of little importance. The Yorkshire and Derbyshire extends south from Leeds to near Derby, and covers in its northern portion a breadth of about 25 m. Some small but very productive coal basins lie S. W. of Derbyshire, of which that near Coventry is the most southern locality of coal in the midland counties. On the N. W. is the Cumberland and Whitehaven coal field, extending along the coast to the north of Maryport; some of its mines have been worked beyond low-water mark, and the convenience of shipping gives a high importance to their products. The Lancashire coal field lies W. of a range of hills that extends along the borders of this county and Yorkshire, separating the two coal fields by the underlying shales and millstone grit of which they are composed. The strata of the coal formation on the west side dip toward the west, and the margin of the field in this direction reaches to Prescot, near Liverpool, and extends N. E. toward Colne. A little beyond the southern extremity of the Lancashire coal field is that which supplies the potteries near Newcastle in Staffordshire, and which, with those referred to as lying S. W. of Derbyshire, make up the central coal district as grouped by Conybeare and Phillips. These include the fields of Ashby de la Zouch and Warwickshire. In the South Stafford or Dudley coal field the coal has been worked in a single bed 30 feet thick, and at one locality it has reached a thickness of more than 45 feet. The western coal district comprises the mines in North Wales, the island of Anglesea, and Flintshire. The middle western or Shropshire district comprises those of the Clee hills, Colebrook dale, Shrewsbury, &c.; the southwestern district, those of the forest of Dean, South Gloucester, and Somerset, on both sides of the river Avon, and the coal field of the S. coast of Wales, bordering the Bristol channel for 100 m. E. and W., and stretching inland toward the N. from 5 to 20 m. This field is in convenient proximity to the copper mines of Cornwall, the ores from which are transported to the great smelting establishments on tide water near the coal mines. (See Copper Smelting.) Much of the coal of this region is semi-anthracite, like that of the Cumberland coal field of Maryland, and some is true anthracite. The latter was first successfully applied upon a large scale to the smelting of iron ores in this district at the Crane iron works. Iron ores abound in the coal measures of this field as well as in many of the others, especially that of Dudley at Wolverhampton, near Birmingham. The same measures also yield the fire clay essential for the manufacture of the fire brick required for the furnaces; the limestone for flux is obtained from the same group of strata and other older formations in close proximity, and the millstone grit which underlies and holds as in a

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cup the coal measures furnishes a most durable building stone, also well adapted for withstanding the heat of furnaces. The production of England in coal and iron is stated in the special articles upon these subjects. Beside the coal measures scattered over the area in which they are found, and the newer formations which here and there overlie them, there occur frequent patches, like islands, of rocks of older date, which have intruded through the carboniferous strata and the later formations above them. These are of granite, sienite, and metamorphic slates. Some are basaltic dikes, and one of extraordinary extent appears from under the alluvium on the coast of the German ocean, near Harwood dale, and is thence traced toward the N. W. across the Tees to the western part of Durham. It traverses strata of the lias, oolite, the coal measures, and of the metalliferous or mountain limestone of the lower carboniferous group. Its length is from 50 to 60 m., and in some places it is seen only 25 to 30 feet thick, dipping at a steep angle. The mountain limestone is productive in lead, copper, and zinc ores in 3 districts in England. Veins of galena near Alston moor in Cumberland traverse adjoining beds of limestone and sandstone, yielding well in the former and poorly in the latter. Others are found in the same county, as also in Durham and York in the upper portions of the valleys of the Tyne, the Wear, and the Tees. Pyritous copper is obtained S. W. of Alston moor, and near Ulverstone beds of red hematite alternate with those of the same limestone. A second district is in Derbyshire and the contiguous parts of the neighboring counties. Zinc blende is economically worked in this district, which also includes the copper mine of Ecton in Staffordshire. The mineral productions are further noticed in the articles Derbyshire and Fluor Spar. The third district is in the N. E. part of Wales, where mines of galena and calamine have long been profitably worked, lying partly in the mountain limestone and partly in older formations. Bordering the coal fields frequently are seen the strata of the old red sandstone and other rocks of the Devonian series; and from beneath these appear the older and lower fossiliferous strata of the silurian and Cambrian formations; they produce little of economical importance. The metalliferous districts of Cornwall and Devon have already been noticed in the articles upon these counties; see also Copper and Tin, in which the amount of production of these metals is specified. The granitic rocks and metamorphic slates, such as are seen in this portion of England, are repeated in North Wales, where the argillaceous slates are worked in the immense quarries near Bangor. The same rocks occur again in the N. W. part of Yorkshire and Lancashire, and are traced through Westmoreland and Cumberland into Scotland. The granites afford but little good building stone, and there are no important quarries of this rock in England. Building stone of durable character or good qualities in other respects is not readily found in any of the formations; while, on account of the humid atmosphere causing the stones to rapidly disintegrate, the want of durable materials is the more sensibly felt for important structures. The magnesian limestone selected for the new houses of parliament is described under Bolsover Stone. It has not proved so durable as was expected, and its decay is so rapid, that it is now being coated with a composition to preserve the surface from further disintegration. England is deficient in fine marbles and in good iron ores. The best of the latter are the hematites; but those chiefly employed in the immense production of iron of this country are the poor argillaceous ores of the coal formation. For making the excellent cast steel, for which English manufacturers are celebrated, the better iron from the magnetic and specular ores of Norway and Sweden is largely imported. The annual produce of salt is nearly 600,000 tons, a large part of which is exported to America. The climate is subject to great variations of heat and cold, and of dryness and moisture, but the winters are not severe for the latitude, and the heat of summer is often relieved by periods of cool weather. The atmosphere is chilly and damp, and particularly moist in the W. counties, but the E. coast is the colder. The mean annual temperature of the S. W. at sea level is about 52°; at Greenwich, 49°; at Penzance, 51° 8'. There is thus an increase of mean temperature from N. to S. and from E. to W. July and August are the hottest months; December and January are the coldest, the thermometer in the latter two near London having a mean height of 39° 7'. The W. and S.W. are the most prevalent and constant winds, but a blighting N. E. wind often blows upon the E. coast, doing great damage to the crops and live stock of Norfolk and Kent. Notwithstanding the humidity of the climate, the annual average fall of rain is less than in the Northern United States. For the British islands it is given as 32 inches, while at Cambridge, Mass., it is stated by Prof. Guyot to be 38 inches, and at the Western Reserve college, Ohio, it was found by Prof. Loomis to be 36 inches. The general character of the soil is that of great fertility, though there are 6,000 or 7,000 sq. m. of land unfit for cultivation. The cultivated crops are wheat, oats, beans, barley, rye, turnips, potatoes, clover, hops, flax, &c. Few of the forests are extensive, but the country is well wooded, most of the timber being found in small plantations belonging to private individuals. There are some very large forest lands, however, such as the New forest in Hampshire, Dean forest in Gloucestershire, and Sherwood in Nottinghamshire, which are the property of the crown. The principal trees are the oak, ash, mountain ash, fir, beech, sycamore, maple, poplar, elm, larch, pine, chestnut, horse chestnut, and willow. There are not many indigenous fruits; the pear, crab, medlar, wild cherry, bullace, raspberry, blackberry, gooseberry, currant, strawberry, and cranberry, are the most important species. Foreign fruits,

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however, except such as require a powerful sun to bring them to maturity, are found to thrive. Of the small herbaceous plants, beside the common grasses covering the country with verdure which the winter seldom destroys, may be mentioned the daisy, primrose, cowslip, violet, hyacinth, harebell, tamarisk, musk, gentian, foxglove, henbane, hemlock, and nightshade.—The various improvements which modern science has introduced in agriculture are generally adopted in England, and under careful management the land, which once with difficulty supported a population of 10,000,000, now easily maintains nearly double that number. The best systems of drainage are employed, not as formerly in marshy grounds alone, but in nearly all farms. Artificial manuring receives due attention, and steeps which a few generations back would have been thought waste land are now under profitable culture. English husbandry, however, has risen to its present high state very slowly. The farms are small, averaging in England and Wales about 111 acres each, and there are comparatively few landowners, most of the farms being held by tenants at will or by lease. But for this the capabilities of the soil would doubtless be still more thoroughly developed than they are now. The best tilled counties are those of the E. coast. The capital used in tilling and stocking land is about £200,000,000; rent of farms, £30,000,000. Cattle raising is a most important branch of husbandry, and the country has been famous for live stock since the days of Cæsar. Somewhat more than the half of the arable land is used for grazing, the best pastures being found in Buckinghamshire, Kent, Middlesex, and several of the W. and midland counties. In the last are bred good dray horses. Yorkshire is noted for carriage horses, and an excellent breed for farm labor is raised in Suffolk. The English race horse is renowned for speed and beauty. Mules and asses are little used. Lancashire is noted for its long-horned cattle; Northumberland, Durham, Devonshire, Herefordshire, and Sussex, for their short-horned breeds, and Suffolk for its duns. Essex, Cambridgeshire, and Dorset are celebrated for good butter; Cheshire, Gloucestershire, Wilts, other W. counties, and Leicestershire, for cheese. The well-known Stilton cheese is made in the last-named county. The sheep are highly prized for the quality both of their flesh and of their wool. By an estimate compiled from the returns of 10 counties, and a part of Yorkshire, in 1854, it appeared that there were under tillage in England and Wales 12,441,776 acres; under grass, 15,212,203 acres; planted with wheat, 3,807,846 acres; barley, 2,667,776; oats, 1,302,782; rye, 73,731; beans and peas, 698,188; vetches, 218,551; turnips, 2,267,200; mangel wurzel, 177,263; carrots, 12,638; potatoes, 192,287; flax, 10,156; hops, 18,976; osiers, 1,079; other crops, 97,334; in bare fallow, 895,969. Number of horses, 1,050,931; colts, 258,079; milch cows, 1,376,703; calves, 707,192; other cattle, 1,339,270; sheep and lambs, 21,054,812. Many of the wild animals which formerly inhabited the forests, such as the bear, wolf, wild boar, and wild cat, have disappeared, and the stag, fallow deer, and roe have been preserved only by strict game laws. The other indigenous wild quadrupeds are the fox, badger, polecat, beech and pine martens, otter, weasel, stoat, hedgehog, mole, squirrel, hare, rabbit, dormouse, lemming, shrew, and several varieties of the rat and mouse. More than 270 species of land and water birds have been noticed, of which 20 are birds of prey and 80 belong to the gallinaceous kind. The bustard seems to be the only bird which has become extinct here. Of about 170 species of fish which frequent the coasts, rivers, and lakes, the chief are the herring, pilchard, mackerel, sprat, cod, and salmon. The sea fisheries are chiefly of cod, mackerel, oysters, and lobsters.—The manufactures of England are commensurate with her greatness in other respects. The most important is that of cotton, which employs more hands than any other in the kingdom, and furnishes about ⅔ of the exports. The principal seats of this manufacture are Lancashire, Cheshire, Derbyshire, and Yorkshire. The number of cotton factories in England and Wales in 1856 was 2,046; spindles, 25,818,576; power looms, 275,590; males employed, 148,354; females, 192,816; total, 341,170. The total amount of raw cotton imported in 1858 was 8,654,633 cwt., of which 5,846,054 cwt. were from the United States, and 2,235,162 cwt. from the British East Indies. Total value of yarns and goods exported during that year, £42,797,000. The chief woollen and worsted manufactories are in Yorkshire, Lancashire, and Gloucestershire, and the value of goods annually produced by them is about £25,000,000. The raw material is mostly of domestic growth, though for some years past large quantities have been imported. The great centres of the hardware manufactures are Birmingham and Sheffield, the former having workshops of iron, steel, copper, and brass, and the latter being famous chiefly for cutlery, agricultural implements, grates, fire irons, &c. The making of linen is carried on to some extent in Leeds and the counties of Lancaster, Dorset, Durham, and Salop. The silk manufacture made great progress under the tariff of 1826, before which date it was unable to compete with the opposition of France and Italy. About 50,000,000 lbs. of leather are made annually. The glove trade of the midland and W. counties is important, the principal establishments being at Woodstock, Worcester, Ludlow, Hereford, Yeovil in Somersetshire, &c. The vast number of establishments engaged in the book and newspaper publishing business gives a strong impetus to the production of paper, the quantity of which made in England in 1858 was 128,929,067 lbs., and in the United Kingdom 176,298,997 lbs. The amount of duty charged on paper in England and Wales during the year ending March 31, 1858, was £920,609, and in the United Kingdom, £1,344,135. Distilling is carried on to much smaller extent than in Scotland and Ire-

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land, but the breweries are very numerous, and many of them on the largest scale. The quantity of malt made in England in 1858 was 38,000,871 bushels, and in the United Kingdom, 45,967,461 bushels. The other manufactures comprise hats, glass, pottery, soap, lace, &c. Ship building is also a prominent branch of industry. The number and tonnage of the vessels built and registered in the United Kingdom in 1857 are stated in the subjoined table, which we give, because of the impossibility of distinguishing those properly belonging to England alone; and this remark also applies to various other statistical statements contained in this article:

Materials.	Sailing.		Steam.		Total.	
	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
Timber	1,012	184,203	73	2,978	1,085	187,181
Iron	38	13,351	155	49,940	193	63,291
Total	1,050	197,554	228	52,918	1,278	250,472

The commerce of England, until the rise of the trading and maritime power of the United States, had long been without a parallel. Her situation is in the first degree favorable for such pursuits; the hardihood, industry, and enterprise of her people have turned her natural advantages to account, and there is no part of the world accessible to her merchants with which she has not established commercial relations. With Ireland she has a trade in grain and provisions in exchange for manufactured goods; from N. Europe she receives timber, iron, flax, hemp, pitch, tallow, potash, and wheat; from central Europe, agricultural produce, silk, linen, lace, gloves, timber, flax, wine, and gin; from S. Europe, wine, brandy, fruit, drugs, silk, &c.; from the United States, cotton, tobacco, rice, and flour, the imports thence being considerably inferior in value to the exports thither; from South America, hides, skins, indigo, cochineal, and bullion; from Asia, tea, coffee, sugar, indigo, drugs, cotton, piece goods, and ivory; from Africa, drugs, ivory, teak wood, and hides. Manufactured goods are the staples furnished by England in exchange for all these commodities. The following table shows the commerce of the United Kingdom for 4 years ending with 1857:

Years.	Imports.	Exports.		
		Produce and manufactures of the United Kingdom.	Foreign and colonial merchandise.	Total exports.
1854	£152,591,513	£97,154,726	£ 8,648,978	£115,833,704
1855	148,660,335	95,688,085	21,012,956	116,701,041
1856	172,544,154	115,826,948	28,393,465	189,220,343
1857	187,646,335	122,056,107	23,358,765	145,419,872

The imports into the United Kingdom during the 11 months ending Nov. 30, 1857 and 1858, were as follows:

Articles.	1857.	1858.
Cotton wool	£26,788,000	£26,846,000
Wool (sheep's)	8,658,000	7,717,000
Silk	6,165,000	5,488,000
Flax	3,863,000	2,708,000
Hemp	1,763,000	1,520,000
Indigo	2,080,000	2,167,000
Hides	3,796,000	2,905,000
Oils	3,206,000	2,979,000
Metals	3,496,000	3,191,000
Tallow	2,718,000	2,240,000
Timber	6,465,000	5,488,000
Guano	2,217,000	3,634,000
Seeds	2,494,000	2,065,000
Tea	4,200,000	4,529,000
Coffee	1,558,000	1,905,000
Sugar and molasses	14,726,000	11,868,000
Tobacco	1,651,000	1,522,000
Rice	1,619,000	1,475,000
Fruits	1,080,000	569,000
Wine	3,554,000	1,803,000
Spirits	2,597,000	1,059,000
Grain and meal	17,228,000	18,714,000
Provisions	3,770,000	2,880,000
Miscellaneous and unenumerated	37,309,000	31,290,000
Total	£168,812,000	£144,022,000

The exports of British and Irish produce and manufactures in 1857 and 1858 were as follows:

Countries to which exported.	1857.	1858.
United States	£18,985,989	£14,510,616
Hanse towns	9,585,902	9,024,485
Holland	6,884,394	5,476,423
France	6,213,326	4,861,558
Turkey	3,107,401	4,256,406
Brazil	5,541,710	3,961,264
Russia	8,098,819	8,096,278
Foreign West Indies	3,079,503	2,590,258
Spain	2,012,528	2,071,089
Egypt	1,809,259	1,985,823
Prussia	1,741,044	1,975,487
Belgium	1,727,204	1,812,686
China (exclusive of Hong Kong)	1,728,885	1,740,782
Hanover	1,687,741	1,693,942
Two Sicilies	1,088,982	1,569,296
Portugal	1,456,921	1,482,159
Austrian territories	1,112,359	1,287,055
Sardinia	1,201,210	1,174,490
Peru	1,171,864	1,159,455
Chili	1,520,618	1,117,573
Buenos Ayres	1,287,096	1,008,444
All other foreign countries	9,168,092	8,644,778
British East Indies	11,666,714	16,782,515
Australia	11,692,524	10,464,198
British North American colonies	4,329,035	3,159,055
British West Indies	1,839,413	1,791,931
All other British possessions	16,864,024	16,099,073
Total	£122,066,107	£114,641,381

The exports in 1858 were thus distributed: cotton, woollen, silk, and linen yarns and manufactures, £63,667,000; hardware and cutlery, £3,380,000; machinery, £3,604,000; iron, £11,236,000; copper and brass, £2,854,000; lead and tin, £2,238,000; coals and culm, £3,053,000; earthenware and glass, £1,721,000; beer and ale, £1,852,000; butter and cheese, £632,000; soda, £813,000; salt, £288,000; spirits, £207,000; leather manufactures, £1,011,000; printed books, £390,000; stationery, £804,000; plate and watches, £254,000; furniture, £258,000; soap and candles, £367,000. The imports of bullion in 1858 were: gold, £22,793,000; silver, £6,700,000; total, £29,493,000, of which £9,066,000 was from Australia, £6,835,000 from Mexico, South America, and the West Indies, £4,811,000 from the United States, £3,813,000

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from Russia, Hanse towns, Holland, and Belgium, and £2,733,000 from France; exports: gold, £12,565,000; silver, £7,063,000; total, £19,628,000, of which £10,921,000 was to France, £5,220,000 to India and China, and £1,569,000 to the Hanse towns, Holland, and Belgium. The entrances, clearances, and tonnage of vessels engaged in the foreign and coasting trade of the United Kingdom in 1858, were as follows:

Countries to which the vessels belonged.	Entered.		Cleared.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
United Kingdom and dependencies	19,256	5,223,311	23,455	5,878,986
United States	1,276	1,186,951	1,308	1,229,171
Norway	2,187	482,954	1,879	262,762
Prussia	1,286	318,697	1,877	325,460
Other German states	1,887	398,183	3,455	546,497
Denmark	2,400	338,479	2,999	302,228
France	2,716	288,541	4,294	455,953
Italian states	701	204,403	901	260,097
Holland	1,228	171,173	1,811	278,475
Sweden	720	120,052	798	139,080
Russia	283	70,440	242	72,268
Spain	251	59,412	265	67,650
Belgium	170	36,724	259	61,940
Portugal	127	19,159	134	21,304
Other European states	181	35,174	189	36,725
All other countries	17	6,480	16	6,169
Total	34,591	8,916,133	42,834	9,936,705

The registered shipping of the United Kingdom, Dec. 31, 1857, was thus distributed:

Divisions.	Sailing.		Steam.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
England and Wales	19,117	3,398,172	1,868	296,515
Scotland	3,214	558,623	294	80,664
Ireland	2,075	218,450	151	38,683
Total	24,406	4,075,245	1,813	415,862

The ocean steam navigation of England is incomparable, and her lines of steam packets may be said to perform the mail service of the world. Steam vessels of iron are now extensively built. The means of internal communication are superior to those of any other country. It is just a century since the English began to make good roads, though turnpikes were set up a hundred years earlier. The total length of all roads in England and Wales, exclusive of paved streets and roads in towns, is about 100,000 miles; of the latter, 30,000. The canals of England are next in importance to those of Holland, and were commenced in the last century. The railway system was introduced in 1830. The following table shows the length of railways in the United Kingdom, Dec. 31, 1857, and their receipts for the previous 6 months:

Divisions.	Miles of railway open.	Receipts from passengers.	Receipts from freight.
England and Wales	6,778	£4,890,581	£5,290,046
Scotland	1,250	592,677	780,447
Ireland	1,070	428,696	178,725
Total	9,098	£5,911,244	£6,189,218

The number of passengers carried during the same period was, in England and Wales, 62,927,762; Scotland, 8,153 825; Ireland, 4,752,427; total, 75,834,014. There were 993 m. of railway in course of construction, but not begun, and 3,554 authorized.—The total number of letters delivered in 1858 was, in England, 428,000,000 (nearly ¼ in London and suburbs); Ireland, 44,000,000; Scotland, 51,000,000; total, 523,000,000, showing an increase of 19,000,000 as compared with 1857. The number of newspapers posted in 1858 was 71,000,000. The persons employed in the post office on Jan. 1, 1859, numbered 24,372. The public institutions of charity, of learning, of the arts, of education, and of religion, are in great number and of high repute. Every considerable town has its hospitals, many of which are liberally endowed, its free schools, mechanics' institutes, &c. The principal cities possess galleries of art, and several have valuable libraries. Compulsory provision for the poor has long been established in England. The whole country is divided into poor law unions, over which are guardians elected by the rate payers. During the quarter ending Dec. 31, 1858, there were, in 627 unions and single parishes, 826,655 paupers in receipt of relief, a decrease of 75,377 from the corresponding period of 1857. The number of pauper lunatics in asylums, hospitals, and licensed houses, Jan. 1, 1858, was 17,572, and probably 12,000 or 13,000 more were supported by the poor law guardians in workhouses, or with private persons. The total amount expended by the poor law boards in England and Wales during the half years ending March 25, 1857 and 1858, was £2,043,977. The number of charitable institutions other than schools, in London alone, in 1853, was 530, and the amount expended by them during the year, £1,805,635.—England has done much for the cause of education, but not so much as should have been done by so old, wealthy, and humane a nation. The principal universities, which have existed for many centuries, are among the most venerable monuments of the middle ages; and as much of the illiberality that once was conspicuous in their government has disappeared, it may be believed that their future will be as brilliant as their past has been useful. Among the higher institutions of learning are the universities of Oxford, Cambridge, and Durham; University college and King's college, London (the last 2 founded for the purpose of cheapening and popularizing academical instruction); college of preceptors, London; Owen's college, Manchester; Manchester New college; Queen's colleges, Birmingham and Liverpool; St. David's college, Lampeter; royal agricultural college, Cirencester; beside good foundation schools at Winchester, Eton, Manchester, Great Berkhamstead, Warrington, Shrewsbury, Birmingham, Tunbridge, Westminster, Highgate, Bedford, Ipswich, Repton, Rugby, Harrow, and London. The great public schools of Eton, Westminster, Harrow, Winchester, St. Paul's, the charterhouse, and merchant tailors' school, are of the highest reputation, and have educated many of the distinguished men of England. The University

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college and King's college, established in the capital, have not only proved useful institutions themselves, but their foundation has had a good effect on the old universities. There are 304 collegiate and grammar schools, and 1,607 other schools, the annual value of the endowments of which is estimated at £500,000, but not ⅔ of this amount is made available for the purposes of education. Though parliament has sought to investigate the causes of this breach of trust, no correction of the evil has been made. The number of schools of the common class, for the diffusion of popular education, was, in 1851 (including both public and private schools), 44,836. The private schools were 29,425, of which only ¼ were ranked superior. Of the inferior schools, nearly ½ of the whole, the returns of 708 were signed by the master or mistress with a mark; and the same strange fact occurred in the returns of 35 public schools, most of them having endowments. The number of scholars attending day schools in 1851 was 2,144,378; Sunday scholars, 2,407,642. Though little has been done for general education, compared with what has been effected in some other countries, yet the improvement has been great within 60 years, the present generation of Englishmen being in every respect more enlightened than their ancestors. Government has done but a small part in the work; and it was not until 1833, when Lord Grey was at the head of that whig ministry which carried through the reform bill, that the first public grant was made. It was £20,000, which was continued for 5 years, when the amount was raised to £30,000. From time to time it was increased, until in 1853 it reached to the sum of £260,000. The amount expended in Great Britain for education grants in 1857 was no less than £559,974, of which £119,664 was spent in building, enlarging, repairing, and furnishing elementary and normal schools, and £57,221 in annual grants to training colleges. Of the amount expended the following were the principal recipients in England:

Church of England schools	£357,597
Wesleyan schools	32,890
British and foreign school society	50,023
Parochial union schools	5,224

The grant to Roman Catholic schools in Great Britain was £25,894. Among the educational grants in 1858 were £663,435 for public education in Great Britain, £83,730 for the department of art and science, and £3,654 for the university of London. The total amount granted for Great Britain and Ireland was £1,126,607. The grants to elementary schools in England and Wales, the channel islands, and the isle of Man, from parliamentary votes, from 1833 to 1857 inclusive, amounted to £2,055,642 5*s.* 4*d.* The subject of national education is increasing in interest in England, and it is supposed that determined efforts will be made to establish some system of general application, at no very distant day. The question of religion is that which causes the chief difficulty in the way of comprehensive working on the part of the government. The dissenters believe that any plan which the government might adopt would be too much under the dominion of the established church, and they not only discourage state interference, but some of them object to all kinds of aid from the state, deeming the voluntary principle the proper basis of action, as well in the support of schools as in that of religious worship. Sectarian influence everywhere exhibits itself in the educational movements of England, and the exertions of the dissenters consequent on the government's supposed desire to favor the church's claim to superintend popular education have done much to spread knowledge. Rivalry has been productive of good in this instance, as it has been in some other. It is not possible to see what will be the ultimate course adopted, but the practical character of the nation cannot fail to devise some plan that shall prove acceptable to the great body of the people. The educational movement has among its supporters men of all parties, and of various religious views, the opinion prevailing that upon the elevation of the people through its success depends their own private individual happiness, and the increase of the strength and reputation of the British empire.—The established religion is that of the church of England, which will be treated in a separate article. The dissenters constitute some of the most respectable religious bodies in the world. They consist of Presbyterians, Independents, Baptists, Friends, Methodists, Unitarians, Bible Christians, Moravians, and some others. The Presbyterians, Methodists, and Baptists are severally divided into a number of sects. The Catholics are not numerous, but among them are many old and wealthy families. The Jews are few in number, but since July 23, 1858, when they were admitted to sit in Parliament, they have enjoyed all civil rights. The utmost religious liberty exists.—The number of journals of all descriptions (exclusive of monthly and quarterly reviews) published in 1858 was, in England, 538 (129 in London); Scotland, 131; Wales, 22; total, 691. —The government is a limited hereditary monarchy, the supreme power being vested in a king or queen and ministry, and a parliament composed of lords and commons, the former sitting chiefly by hereditary right and the latter by popular election. A previous knowledge of English history being required for a comprehension of the changes and present state of the English constitution, we shall refer the reader for an account of the latter to the concluding part of this article.—The following tables show the revenue and expenditure of the United Kingdom for the fiscal year ending March 31, 1858:

REVENUE.

Customs	£23,109,104
Excise	17,825,000
Stamps	7,413,719
Taxes	3,152,663
Property tax	11,586,114
Post office	2,930,000
Crown lands	276,654
Miscellaneous	1,596,887
Total	£67,881,513

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Expenditure.	£.	s.
Interest and management of the funded debt	23,573,975	06
Unclaimed dividends paid	88,280	18
Terminable annuities	3,979,955	17
Interest of exchequer bonds, 1854-'5	210,000	00
Interest of exchequer bills, supply	774,648	06
Redemption of exchequer bonds	2,000,000	00
Civil list	401,257	11
Annuities and pensions	334,997	07
Salaries and allowances	157,548	13
Diplomatic salaries and pensions	158,963	18
Courts of justice	563,224	18
Miscellaneous charges on consolidated fund	178,029	17
Compensation to Denmark for sound dues	1,125,206	00
Army	12,915,156	16
Navy	18,260,000	00
Persian expedition	900,000	00
War with China	590,693	00
Miscellaneous civil service	7,227,719	10
Salaries, &c., of revenue departments	4,358,263	19
Redemption of the £5,000,000 loan	250,000	00
Total	70,378,859	02

The total revenue for the year ending March 31, 1859, was £65,477,284, and the expenditure £64,663,882. The total public debt of the United Kingdom, March 31, 1857, was: funded £779,-701,417, unfunded £24,032,541, total £803,-733,958; of which the permanent debt of Great Britain was £736,009,272, and that of Ireland £43,692,14. The funded debt of the United Kingdom was £757,951,281 in 1854, and on March 31, 1858, had increased to £779,225,000, principally in consequence of the Russian war which broke out immediately after the former date. The standing army consists of 222,874 men, including those dispersed in the colonies and India. Of this number 20,067 are cavalry, 23,342 artillery, and 179,465 infantry. The navy, in July, 1858, comprised 244 sailing vessels of various kinds with an armament of 3,716 guns, and 294 steam vessels carrying 7,075 guns (total 538 vessels, 15,791 guns), beside 160 gun boats and 120 vessels for port service. The government has fine dockyards at Deptford, Woolwich, Chatham, Sheerness, Portsmouth, Devonport, and Pembroke, a naval academy at Portsmouth, a military academy at Woolwich, and a military college at Sandhurst.—The judicial system of England comprises 4 superior courts: the high court of chancery, the court of exchequer, the court of king's bench (termed during the reign of a queer the court of queen's bench), and the court of common pleas. The court of king's bench is the supreme court of common law, and takes cognizance of both civil and criminal causes, and to it can be removed by writ of error the judgments of all other English courts of record. It consists of a chief justice and 4 other justices. The court of common pleas likewise consists of 5 justices, and takes cognizance of civil cases between subjects. The court of exchequer consists of a chief baron and 4 other barons; it is both a law and an equity court, trying all revenue questions and many other cases. The judges of these 3 courts are called the 15 judges of England. There are 4 terms in the year of about 3 weeks each, during which the 3 courts sit at Westminster for the determination of all questions of law. Twice a year 14 of the judges make circuit through England and Wales to try causes in the country. By act of parliament in 1846 and by several subsequent acts a system of county courts has been formed, giving increased facilities for the prompt and inexpensive collection of small debts. The judges of these courts are appointed by the lord chancellor, and must not exceed 60 in number. They have jurisdiction over districts arranged with regard to convenience, and not always bounded by county lines, counties in some cases being divided to form them. Demands not exceeding £50 are brought before these courts, the judges of which determine all questions whether of law or fact unless a jury be summoned, which is done at the request of either plaintiff or defendant. The number of the jury is 5, and a unanimous verdict is required. A court of general quarter sessions of the peace is held 4 times a year in every county, its jurisdiction extending to all felonies and trespasses, but the capital cases generally are remitted to the assize. The counties are governed by the lord lieutenants and sheriffs, and they have also their justices of the peace appointed by the crown, clerks of the peace, and county coroners. The character of the English courts is very high, and has been so ever since the revolution. The criminal code of England, which was for a long time excessively severe, has been greatly improved of late, and with its improvement, crimes, especially acts of violence, have signally decreased. The number of persons committed to prison in England and Wales in 1857 was, males 107,384, females 34,-586, total 141,970. Of 54 sentenced to death (20 for murder), 13 were executed, the punishment in all the other cases being commuted. The greater proportion of convicts sentenced to long terms of detention were formerly transported to penal colonies or confined on board hulks, but prisons are now established at home capable of receiving all. The principal prisons are those of Millbank, Pentonville, Portland, Dartmoor, Portsmouth, Chatham, Brixton, Parkhurst, Eulham refuge, and a hulk at Portsmouth. There were also at the beginning of 1858, 40 certified reformatory schools in England with 1,866 inmates, and 22 in Scotland. The police force of England, Sept. 29, 1857, was 19,187, and the cost of maintaining it during the year ending at that date was £1,265,579.—The history of England begins shortly before the commencement of our era, when (55 B. C.) Cæsar first invaded the island, landing near Deal or Walmer. Britannia and Albion were the names by which it was known to the Romans. The Phœnicians had known the island, and so had the Carthaginians and Massilians, and all of them are supposed to have traded with it directly or indirectly, the Phœnicians especially, for tin. The interest that Cæsar's invasion caused at Rome, among the best informed men there, shows how little was really known concerning the country, and even for a long period afterward it was regarded as cut off from the rest of the world. He made little impression on it, and his invasion probably met with more resistance than is commonly supposed. Augustus proposed

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an expedition to Britain, but never attempted it. Caligula also threatened invasion, and triumphed without executing it; but it was reserved for Claudius to begin the work of real conquest (A. D. 43). During the next 40 years the conquest of south Britain was completed, many generals being employed, including Aulus Plautius, Vespasian, Suetonius Paulinus, and Agricola. The main divisions of the country were Britannia Romana, embracing England and Wales, and which had been entirely subdued; and Britannia Barbara, which at first included all the country to the north of the wall of Hadrian, but later only what was to the north of the wall of Antoninus. This region defied all the efforts of the Roman arms. The other was in a very flourishing condition, and at a later period was divided into 5 provinces, named Britannia Prima, Britannia Secunda, Maxima Cæsariensis, Maxima Flaviensis, and Valentia. The country suffered with the rest of the empire from the invasions of barbarians, and was abandoned by the Romans in the earlier part of the 5th century. The Britons then became independent, and displayed much energy and spirit in contending with the invaders. They were less successful in their endeavors to establish a body politic, and the island was distracted by contentions and civil wars. The disturbed state of the country was favorable to the incursions of the Picts and Scots, when a few Saxons, said to have been exiles, arrived in the isle of Thanet. They were but 300, and were led by two brothers commonly called Hengist and Horsa. They were, it is probable, on a piratical excursion. The story that they came by invitation is unfounded, and probably originated in the fact that other Saxons were subsequently invited to Britain. The British chiefs resolved to hire their visitors as soldiers, according to a not uncommon custom. They chastised the Scottish invaders, and when the Saxon leaders proposed sending for more of their countrymen, in order that their defensive measures might be more extensive, the proposition was readily received, and numbers of Saxons, Angles, and Jutes arrived in the country. At first these strangers proved good friends to the Britons, but when they had conquered the other barbarians they took Britain for their reward. This, however, was not effected without a bloody contest, in which the Britons evinced great bravery, and at one time are said to have expelled their false allies. The history of these times is little better than fable, and the very names of Hengist and Horsa are perhaps as mythical as those of Romulus and Remus. The most that is known is, that certain Germanic invaders subdued the greater part of Britain, and laid the foundation of that England which has occupied so large a space in the history of the world for so many centuries. We know the result, but of the processes we know next to nothing. These invaders appear to have belonged substantially to one race, but they had strong points of difference, which were particularly prominent as between Saxons and Angles. Lappenberg, in summing up the Saxon conquest, says: "So trivial, and yet more uncertain, are the accounts left us of the conquest of a great kingdom by the barbarous dwellers on the German ocean, and of the spoliation perpetrated among structures and other property, the fruits of Roman civilization, on a people accustomed to servitude, who knew but little how to use them, and still less to defend them." Kemble expresses the opinion that the Anglo-Saxon kingdoms for a long period were only so many camps planted upon an enemy's territory, and not seldom in a state of mutual hostility. One effect of this German conquest was to cause Britain to revert to heathenism, and one of the fairest provinces of Christendom was apparently lost; but in the pontificate of Gregory the Great it was recovered, and the work of Saxon conversion commenced, under the guidance of Augustin. The octarchy, improperly called heptarchy, dates from A. D. 560. Turner rejects the statement that it was by Egbert that the name of England was formally bestowed upon Germanic Britain, but Lappenberg's arguments in support of it seem to be conclusive. It was in Egbert's reign, the first 3d of the 9th century, that the Northmen first appeared in force in England; and it shows the vitality of the old British race, that numbers of them joined the invaders. There had been previous attacks, but this was the most serious; it was unsuccessful, and the Britons who had risen were severely punished. These invasions were constantly renewed, the Northmen and Danes being the terror of all peoples who could be reached from the sea. Large portions of England fell into their hands. Much of Alfred's reign was passed in contests with them. The fortune of these wars was various, but even the victories of the Anglo-Saxons cost them dear; yet it is probable that the general result was good, and that the infusion of new blood into England prevented the country from degenerating rapidly, and gave to it a new life. Much of what is called Saxon is of Danish origin; but it should be mentioned that the Danes and Saxons were substantially of the same race, the differences that there were being in favor of the former. A Danish dynasty was established in the early part of the 11th century, and the name of Canute, or Knud, is high on the list of England's sovereigns. The Saxon dynasty was restored in 1042, in the person of Edward the Confessor, on whose death the throne was conferred on Harold, son of Earl Godwin, a great Saxon statesman. His reign was destined to a sudden and tragical termination. An event was impending over England which was to color her history forever. The Normans, descendants of those Northmen who had settled in Neustria (N. W. France), had obtained considerable influence in England in the Confessor's time, and were indeed the leading race of the West. William, duke of Normandy, claimed the throne of England through his great-aunt, a title utterly worthless. Neither William nor Harold had

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any legitimate pretensions to the throne, but Harold had the support of the English nation, and William assembled a powerful army to enforce his claim. The support the duke received from his own subjects was reluctantly given, but the promises of spoil he held out attracted to his service a large number of adventurers from different parts of Europe, so that he was enabled to land 60,000 men in England. Harold, who had just defeated an army of Norwegian invaders, met the Normans at Hastings, where he lost his life and his kingdom, Oct. 14, 1066. William's victory was complete, and the Normans and other adventurers soon became masters of all England. Saxons and Danes were involved in common slavery. The victor introduced the feudal system into England. It is probable the extent of the Norman spoliation has been much exaggerated, but that the natives were reduced to a state of political bondage admits of no doubt whatever. The very name of Englishman was made odious. A foreign rule was established over England, and it was not until 7 generations from the conquest had passed away that the distinction between Norman and Saxon was nearly obliterated. It did not disappear altogether until a much later period, but it ceased to influence legislation in the last days of the 13th century, or soon after that time. The Norman line gave 3 sovereigns to England: William I., William II., and Henry I. The death of the latter, in 1135, was followed by the reign of Stephen of Blois, his nephew, and by the wars between that king and the adherents of the old dynasty. Henry I. left an only daughter, Matilda, married first to the emperor of Germany, and then to Geoffrey, earl of Anjou, by whom she had that prince who became Henry II. of England in 1155. England suffered terribly in the contest between Stephen and Matilda, the rightful heiress to the crown, who was supported by a powerful party. Henry II. became king in consequence of an arrangement with Stephen, who had lost his only son Eustace; but the treaty was really the work of the barons, who had risen to high power during Stephen's reign. The young king was the founder of the royal family of Plantagenet, which held the English throne 330 years, and from him, in direct line, Victoria is descended. He had Saxon blood, his great-grandmother on the island side being a Saxon princess, and having in her veins the blood of Alfred. There have been few abler monarchs than Henry II. His foreign possessions were vast. He was duke of Normandy and count of Anjou, and having married Eleanor of Aquitaine, was also duke of Aquitaine and count of Poitou. Maine belonged to him. He undertook the conquest of Ireland. Had it not been for his dispute with Becket, and the domestic troubles that happened at a later period of his life, he might apparently have conquered the whole of France. The crusades, too, had an effect prejudicial to his interests. He died in 1189, and was succeeded by Richard I. (Cœur de Lion), who was more a crusading chief than a king, and more a knight-errant than either. The English are proud of him, yet he was a Frenchman, could not speak the language of the island people, and kept out of England whenever he could. His brother and successor, John, ascended the throne in 1199. It is from his reign that England dates the renewal of her existence as a nation. John was one of the weakest and most wicked of kings; he is one of the few men, eminent either from talent or position, who, after having been long regarded as monsters, have had nothing said in their favor by modern writers. The character and conduct of Richard III. have been defended with plausibility; Henry VIII. has been pronounced almost a perfect monarch by one of the great lights of this age of historical criticism; but John is held to be as bad now as he was in those times when Shakespeare furnished such life-like portraits of English kings. He is the same "trifler and coward" to posterity that he was to his contemporaries; and the highest authority assures us that his follies and vices were the salvation of England. His French rival, Philip Augustus, was an able statesman. Their contests were ruinous to John as a continental sovereign. Normandy, Brittany, and Anjou were lost. The English Plantagenet had little more than England for his dominion. His continental possessions were all to the south of the Loire. The insular Normans were separated from the continental Normans, and were compelled to have the same interests with the mass of the people. From this came the series of events that led to the concession of the great charter, June 15, 1215. John was involved in disputes with the pope, to whom he afterward resigned his kingdom, and he is said to have offered to turn Mussulman if he could obtain Saracenic aid from Spain against the barons. In a contest with France his troops shared in the loss of the battle of Bovines. The barons called Louis of France to their aid, and he at first was successful, but evincing a partiality for his countrymen he lost ground, many of his first supporters joining John, who was about to fight him, when he died, Oct. 17, 1216. He was succeeded by his eldest son, Henry III., a boy of 9 years. The government was conferred on the earl of Pembroke, who succeeded in compelling the French to make peace and to leave the country. On Pembroke's death power passed to the hands of Hubert de Burgh and the bishop of Winchester, but the former was soon compelled to resign it. The reign of Henry III. is the longest in English history save that of George III., and it was passed in constant troubles. The favor shown to foreigners caused much irritation. There were frequent disputes with the barons, which led to important consequences. Under the lead of Simon de Montfort, earl of Leicester, the barons defeated the king at Lewes, in 1264, and took him captive, and the next year, under Leicester's rule, the first English parliament was assembled. The same year Leicester and his party were destroyed by Prince Edward. The royal author-

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ity was for a time reëstablished, and the prince departed to join the last crusade. Henry's weakness encouraged his enemies, and the country was relapsing into confusion, when he died in 1272. Edward I. ascended the throne without opposition, and proved himself an able and unscrupulous ruler. He was a good sovereign for England, founding permanent legal institutions which have ever since been spoken of with respect, and lessening the public expenditure; but toward foreigners he was faithless and cruel. He conquered Wales and murdered its princes. That country was annexed to England, the king conferring the title of prince of Wales on his son and heir, which has ever since been borne by the eldest son of the sovereign of England. He sought to conquer Scotland, and at one time appeared to have succeeded, but the resistance of the Scotch, first under Wallace, then under Comyn and Fraser, and finally under Bruce, saved their country from becoming an English dependency. Edward was involved in a war with France, which had seized Guienne, one of the few remaining possessions of the English on the continent, but which was restored under papal mediation. His wars made him dependent on parliament, the power of which was much increased in his reign, the commons first sitting in a separate chamber in 1295. He violated the great charter, and for a time showed every disposition to reign arbitrarily; but the opposition he experienced was not to be overcome, and he gave way before it. It was while marching to meet Bruce in Scotland that Edward I. died, on July 7, 1307. His successor, Edward II., was a weak prince, who was unable to comprehend or to accomplish his father's designs. He was governed by favorites, whose insolence provoked the barons, by whom the chief of them, Gaveston, was put to death, in 1312. The king was induced to lead a great army to Scotland in 1314, which was completely defeated at Bannockburn, an event that established the Scottish nation and the throne of Bruce. At the instance of Edward's queen, Isabella of France, parliament deposed the king, who was soon afterward murdered, in Sept. 1327. The government was nominally in the hands of Edward III., a boy of 15, but in reality it was wielded by Isabella and Roger Mortimer, her paramour. These rulers were unpopular, and their unpopularity was increased by a treaty which they made with Scotland in 1329, renouncing all claim to superiority over that country. Mortimer showed himself able and unscrupulous, and the young king had to conspire against him. The queen mother and her lover were seized, and the latter was executed. The reign of Edward III. is looked upon as one of the most brilliant in English history. He was an energetic prince, and repressed the lawless men who had had their way during his father's reign. Aiding Baliol in an attempt to obtain the crown of Scotland, he won over the Scotch the victory of Halidon Hill, but the defeated were not conquered. He set up an absurd claim to the crown of France, in right of his mother, which led to that rivalry of France and England that has endured down to this day. He had numerous allies on the continent, and he led an army into France in 1338, which, however, accomplished nothing. The great naval victory of Sluys was gained by the English in 1340. Troubles with parliament and want of money prevented him from urging the war vigorously, and it was not until 1346 that the battle of Crécy was won by the English. Calais was afterward taken, and the king then made a truce with the French. While he was absent, an army raised by his wife defeated the Scotch at the battle of Neville's Cross, and captured their king, David Bruce. A naval war with the Spaniards followed, and the latter were defeated in a great battle. The terrible pestilence that ravaged the world in the 14th century appeared in England in 1349. The renewal of the war with France led to the battle of Poitiers in 1356, in which Edward, prince of Wales, known as the Black Prince, defeated King John of France, and made him prisoner. In 1359 Edward III. again invaded France, and besieged Rheims, because he wished to be crowned king there. The next year peace was made between the two countries, Edward renouncing all claim to the French crown, but receiving large portions of French territory, and an immense sum of money. The French king, finding himself unable to fulfil the terms of the treaty, went back to England a prisoner, and there died. The prince of Wales, from Guienne, interfered in the affairs of Spain, and won the battle of Najera in 1367, in behalf of Peter the Cruel, and over the French, who, under Du Guesclin, were aiding Henry of Trastamara. The expense of this war caused the prince to become unpopular, and his last days formed a miserable contrast with his early career. He died in 1376, a year before the death of his father. The latter years of the king were also embittered by failure in France, and by disputes with parliament. Not a little was done in this reign toward the development of English industry, and some constitutional questions were settled. The new king, Richard II., son of the Black Prince, was only 11 years old, and a regency was appointed. The war with France languished. The peasantry, headed by Wat Tyler, rose in rebellion, the movement being in principle like the *Jacquerie* that had occurred in France immediately after the battle of Poitiers. The young king showed both tact and courage on this occasion, and gave promise of greater ability than was justified by his career. A war with Scotland led to no results. The ambition of the king's uncle, the duke of Gloucester, caused internal troubles. The king wasted on frivolous pleasures money that had been granted him for other purposes, and he completed his unpopularity by making a long truce with France, and by marrying the daughter of Charles VI., a child of 7 years. His uncle Gloucester sought to avail himself of this unpopularity, but was seized, imprisoned, and put to death, while his

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party was destroyed. Parliament stood firmly by the king. Two of his supporters were the duke of Hereford and the duke of Norfolk, and they quarrelling, the king banished them both, the first for 10 years, and the second for life. Hereford was son of John of Gaunt, the duke of Lancaster, and cousin of the king, and when, on his father's death, the king seized his cousin's estates, the new duke of Lancaster returned to England, and, so great was the monarch's unpopularity, rapidly levied a force that placed him at the head of the country. He compelled the king to resign the crown, and assembled a parliament, which made him king, he having claimed the throne in virtue of his descent from Henry III. According to the received ideas of succession, he had no claim to the throne, which, failing Richard and heirs of his body, belonged to the earl of March, descended from the duke of Clarence, 3d son of Edward III., the new king being son of Edward's 4th son. The reign of Henry IV. began Sept. 30, 1399. Richard was imprisoned, and is supposed to have been murdered at Pontefract castle, but nothing is certainly known of his fate. Henry's reign was one of much interest. The followers of Wycliffe had become very numerous, and the king's father, John of Gaunt, duke of Lancaster, had supported Wycliffe; but the son proved a firm adherent of the church of Rome, and consented to that act for the punishment of heretics which was passed in 1401, and under which so much cruelty was perpetrated for two centuries. The Lancastrian dynasty, by allying itself with the church, postponed the reformation for 4 generations. The reign of Henry IV. was short, but eventful. In a war with Scotland the English won the victory of Homildon Hill. The rebellion of Glendower, in Wales, was highly successful for many years, and that chief was never formally subdued, though finally forced to remain in a state of comparative quiet. A rebellion headed by the earl of Northumberland broke out in 1403, but the victory of the king at Shrewsbury established his power. Other rebellions followed this, and the conspiracies were numerous. The French had insulted the English frequently, and Henry IV. was on the point of renewing the war, when illness compelled him to refrain; and soon after he died, March 20, 1413. His son and successor, Henry V., put down the Lollards with a vigorous hand, and renewed the war with France. Landing in France with a large army, in the summer of 1415, he besieged and took Harfleur. The battle of Agincourt was fought Oct. 25, 1415, and was won by the English against great odds, the French suffering severely. The war was continued, and in 1420 the French government made a treaty with England, by which it was settled that Henry V. should marry Catharine, one of the daughters of Charles VI., and that he should become heir to that king. On Charles's death France and England were to have but one monarch. Fortunately for England—which by its success would have been probably reduced to the condition of a province of France—this plan was destined to fail. Henry died, Aug. 31, 1422, when apparently about to realize his scheme. He left but one child, a boy of 9 months, who became Henry VI., and who was soon the king of a large part of France, his French grandfather dying soon after his father. The king's uncle, the duke of Bedford, carried on the war, and the English were mostly victorious over the French and their Scotch allies. A variety of events, however, among which the exploits of Joan of Arc are the most remarkable, led to a change in the fortunes of the contest, and after many campaigns the French recovered all their country, except Calais, and two other small places, in 1451. Henry VI. proved to be a man of much amiability, but deficient in intellect and vigor of character. During his minority the court was the scene of intrigues and contentions; and when he had arrived at manhood, and married Margaret of Anjou, daughter of René, titular king of Sicily, Naples, and Jerusalem, that able princess became the real head of the state. The conflicts of parties were increased in fierceness, which was in part caused by the throwing of so many public men back upon England, who had lost all they had seized in France. That contest which is known as the wars of the roses, or the disputes of the houses of York and Lancaster for the crown of England, commenced about 1452. Richard duke of York was undoubtedly the legitimate claimant of the throne. Had Henry VI. been an able monarch, the claims of York under the circumstances would have been of little practical importance; but the weakness of the king, and the fierceness of the party contests, united to concentrate men's attention upon the duke, who had many strong points of character, and had served his country well in France and Ireland. He had married Cecily Neville, daughter of the earl of Westmoreland, a near connection of the earls of Salisbury and Warwick, two of the greatest nobles of the realm. The duke expected to succeed quietly to the crown on the king's death, as Henry had no children for many years after his marriage; but in 1453 Prince Edward was born, and the king was reduced by illness to a state of imbecility. York was then made protector; but when Henry, in 1455, recovered his intellect, he resumed power, and showed such favor to the duke's enemies that the Yorkists assumed arms, and that civil war began which did not end until 40 years later. The first battle was fought at St. Albans, May 22, 1455, and was won by the Yorkists, or party of the white rose. The king was in the power of the conquerors, and acceded to all the demands of York, who became protector again on the return of Henry's illness. The queen was less submissive, and nearly succeeded in her attempts to destroy the opposition chiefs. War was resumed in 1459, with various fortune. After the battle of Northampton, July 10, 1460, it was arranged that Henry should remain king for life, but that York should succeed him. Margaret re-

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sisted, and on Dec. 30, 1460, defeated the Yorkists at Wakefield. York and his young son, the earl of Rutland, and his chief supporter, Salisbury, were put to death. The Yorkist claim now passed to Edward, earl of March, the duke's eldest son, a youth of 19, superior to his father in intellectual qualities, but his inferior in virtue and humanity. Edward, who had great military genius, marched against one of the Lancastrian armies, and defeated it, and then proceeded to London, where the people and some of the parliament acknowledged his claims. He was proclaimed king, March 5, 1461; and so prompt were his movements that he met the Lancastrian army at Towton, a few miles from York, the 29th of the same month (Palm Sunday). A hundred thousand men joined battle, and after the most terrible conflict that ever occurred on English ground, victory declared for Edward IV. Margaret renewed the contest with French and Scottish aid, but was beaten at Hexham, May 15, 1464. Henry fell into his rival's hands, and was imprisoned in the tower. The power of the Yorkists being established, they fell to quarrelling among themselves. The Nevilles, at whose head stood the earl of Warwick, claimed more than the king was disposed to grant, even for such services as they had rendered, and which, being too important to be rewarded, naturally made them and the royal house enemies. The king's marriage with Lady Grey, widow of an obscure Lancastrian, gave much offence to Warwick and his friends. The duke of Clarence, a brother of the king, married the eldest daughter of Warwick, to the disgust of the monarch. In 1469 there was a rebellion, headed by the Nevilles, who were aided by Clarence, and the king at one time was their prisoner. Released from confinement, Edward put down another rebellion, and conferred high favors on Clarence and Warwick; but the quarrel was renewed, and failing to seize the king, the rebel chiefs fled to France, where Warwick, under the mediation of Louis XI., joined the party of Margaret of Anjou. Landing in England, and proclaiming Henry VI. king, Warwick was everywhere successful, and Edward fled to Holland. In a few months Edward returned, and was as successful as Warwick had been. In 4 weeks he entered London, having been joined by his brother Clarence. The battle of Barnet was fought April 14, 1471, and the Lancastrians were defeated, Warwick and his brother Montague falling on the field. On May 4, Edward again defeated the Lancastrians at Tewkesbury, Prince Edward, son of Henry VI., falling in the action. Margaret of Anjou was made prisoner, and sent to the tower, where her husband was put to death, May 21. Edward was no more disturbed by the Lancastrians, but the dissensions at his court between different branches of the Yorkist party, and between himself and his brother Clarence, caused him great trouble. Clarence he put to death. He invaded France at the head of a large force, but Louis XI. bought peace of him, and he returned to England. He died in 1483, worn out by debauchery. His successor, Edward V., was not quite 13 years old. The court was divided into two parties, the one consisting of the relatives of the young king on the maternal side, and the other of the old nobility. Richard, duke of Gloncester, the king's uncle, an able and ambitious prince, seized the reins of government, was made protector, put to death several of the monarch's relatives and supporters, and finally made himself king. Edward V. and his brother, the duke of York, were placed in confinement, and soon disappeared, but it is not certain that the common story as to their fate, that they were murdered by Richard's orders, is true. Richard's reign was brief, and was much disturbed by conspiracies; he had offended the Yorkists, and had not conciliated the Lancastrians. A coalition was formed against him, at the head of which stood the earl of Richmond, the last person who could pretend to be the representative of the house of Lancaster. Richmond was the great-great-grandson of John of Gaunt, founder of the house of Lancaster, being descended from the earl of Somerset, son of that prince by Catharine Swynford, his mistress. Somerset had been legitimated by parliament, but cut off from the line of succession to the crown. On his father's side Richmond belonged to the Welsh family of Tudor, his grandfather, Owen Tudor, having married Catharine of Valois, widow of Henry V. of England. Thus Richmond had no legitimate claim to the throne; and even if Richard III. were dead there were several persons who had superior claims to that seat in point of blood, supposing that the limitation of the rights of Richmond's grandfather Somerset was not regarded. But party exigencies overcame every thing, and to satisfy the Yorkists it was agreed that Richmond should marry Elizabeth, eldest daughter of Edward IV. The first effort of the conspirators failed, and the duke of Buckingham, the chief of them in England, was beheaded. In 1485 they were more successful. Richmond landed in Wales at the head of a small force, marched into England, encountered Richard at Bosworth, Aug. 22, and defeated him, the king falling in the battle. Richard would have won an easy victory had it not been for the treachery of some of his adherents. The crown that he wore in the action was placed on the head of Richmond, who was hailed as Henry VII. This monarch, first of the Tudor line, bore himself as chief of the Lancastrian party, and depressed the Yorkists whenever he could do so, though he felt himself compelled to marry the princess Elizabeth. His reign was disturbed by many conspiracies, and by the appearance of pretenders to the crown. The first of these pretenders was one Lambert Simnel, who personated the earl of Warwick, son of the last duke of Clarence, and undoubted heir to the crown failing children of Edward IV. The Irish supported this pretender, who was the son of an English baker, and he was aided by the duchess

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dowager of Burgundy, a sister of Edward IV., and notorious for her hatred of Henry VII. At the head of the miscellaneous force which was collected, Irish and foreign soldiers, the Yorkist leaders landed in England, and had they received any considerable English support, they would probably have succeeded; but they were left to fight unaided, and were totally defeated at Stoke, June 16, 1487. Among the slain was the earl of Lincoln, next to Warwick the chief member of the house of York. Simnel was taken prisoner and made a scullion in the king's kitchen. Another pretender is known to history as Perkin Warbeck, said to have been the son of a Tournay trader, but who claimed to be Richard Plantagenet, duke of York, 2d son of Edward IV., a claim which has found strong defenders. Henry regarded him as a much more important character than Simnel, and foreign potentates treated him as if they believed in his claim. James III. of Scotland gave him one of his relatives in marriage, and marched an army into England to aid him. But all his efforts proved failures. A Cornish insurrection was put down vigorously by the king, at the battle of Blackheath; yet when the pretender entered Cornwall he was regarded as king, was joined by a large force, and laid siege to Exeter. On the approach of the royal army, however, he fled, and subsequently surrendered on condition that his life should be spared. Flying a second time, he again gave himself up on the same terms, but was set in the stocks, and made to read a confession that he was an impostor. Consigned to the tower, he sought to escape, and was hanged at Tyburn (1499). Henry at the same time caused the earl of Warwick, the last survivor of the legitimate male descendants of Edward III., to be put to death, on a groundless charge of conspiracy with Perkin. With these proceedings may be said to have closed the contest between the houses of York and Lancaster, in the complete prostration of the former, though the latter was represented by a bastard member who was not even descended from Henry IV., the founder of Lancastrian royalty. The last years of Henry VII. were more peaceably passed, and he became a powerful sovereign at home, while his influence was great abroad. His master passion was avarice, and he hesitated at no means to gratify it. He pretended to make war on France, but only that he might obtain money from his subjects, and then sold peace to the French monarch. He depressed the power of the high nobility in various ways. The law that no man should be held guilty of treason for adhering to the king *de facto* was passed in his reign. He died April 21, 1509. Henry VIII., his successor, was his second son, the first, Arthur, having died before his father. Arthur had married Catharine of Aragon, one of the daughters of Ferdinand and Isabella, and on his death his father had procured a dispensation from the pope allowing the marriage of Catharine and his second son. This marriage was not solemnized until after the accession of Henry VIII., whose father seems to have had some scruples on the subject. The reign of the new king was destined to be the most momentous in the annals of England. He was frequently engaged in hostilities with foreign countries, and the great victory of Flodden was won by one of his generals over James IV. of Scotland, husband of his sister Margaret. His policy was the result of his passions. That he was troubled concerning his marriage with his brother's widow, after that marriage failed to produce sons that could arrive at maturity, is easily believed, as he was singularly superstitious; but it required his passion for Anne Boleyn to give his scruples much force. Had the court of Rome aided him to a divorce, he would have remained a Catholic; but that court refusing to declare void a marriage which the church had sanctioned, he threw off his allegiance to the pope, and became head of the church in England. He was 6 times married, and 2 of his wives were beheaded and 2 were repudiated. It has been alleged that much that was severe in Henry's treatment of his wives was owing to his desire to have heirs, the wars of the roses in the preceding century having made English sovereigns, statesmen, and people very sensitive on the subject of the succession to the crown. Henry interfered much in continental politics, and the European balance of power theory dates from his time. In his reign the scaffold was constantly occupied by victims from every class of society, the number of whom, however, has been considerably exaggerated. The highest classes were probably the greatest sufferers; the king was impartial in the selection of his victims, and usually as unjust as he was cruel. He died Jan. 28, 1547, and was succeeded by his only son, Edward VI., whose mother was Jane Seymour, Henry's 3d wife. Edward was in his 10th year, and the government was placed in the hands of a council of regency, the principal members of which were the earl of Hertford, the king's uncle, soon created duke of Somerset and protector, and Archbishop Cranmer. In this reign the church of England was established, and the nation placed on the Protestant side in the struggle then going on in Europe. In the contests for power that took place at court, Somerset was finally worsted, and then beheaded. Dudley, duke of Northumberland, into whose hands all power passed, caused his 4th son, Lord Guildford Dudley, to marry Lady Jane Grey, great-granddaughter of Henry VII.; and when Edward VI. died, July 6, 1553, the duke made the lady Jane queen, to whom Edward had been persuaded to bequeath the crown. Her reign lasted but 10 days, and her party was quickly dispersed. Mary, eldest daughter of Henry VIII., ascended the throne, and behaved mercifully toward most of those who had sought to prevent her succession. Northumberland and others were executed, but the lady Jane and her husband were spared until the next year, when they were executed, in consequence of the lady's father, the duke of Suf-

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folk, having taken part in Wyatt's rebellion. Suffolk also was executed. Mary effected a reconciliation with Rome, and gave her hand to Philip II. of Spain. This marriage led to war between England and France, and an English army joined the Spanish force that invaded France, and took part in the battle of St. Quentin. The French succeeded in an attack on Calais, the loss of which shortened Mary's life. She was a devout Catholic, and caused Cranmer, Latimer, Ridley, and about 300 other Protestants, to be burned. Her death, which occurred Nov. 17, 1558, left the throne to Elizabeth, who felt herself compelled to side with the Protestants. Her reign, which lasted more than 44 years, is one of the most brilliant in English history. Sagacious in the selection of her counsellors, she was able to triumph over all her enemies, and to raise her kingdom to the first place in Europe. She ruled over Scotland in fact, and put the sovereign of that country to death after having held her in unjust captivity nearly 19 years. The Huguenots of France and Henry IV. received aid from her, and but for the assistance she gave the Dutch they would have sunk under the power of Spain. She invited the Turks to join her in attacking the pope and the king of Spain; and over both those potentates she achieved a great triumph in 1588, when the armada was destroyed. Both Catholics and Puritans were persecuted by her government. The English mind was then singularly fertile, and some of the greatest names in the literature of England belong to the Elizabethan age. The enterprise of Englishmen led them to circumnavigate the globe, to attempt colonization, to extend trade, and to commence that intercourse with India which was destined to lead to extraordinary results. Elizabeth had not much to do directly with these things; but she was the sovereign of the country, the central figure of a great nation in a great age, and all that was accomplished by her subjects was allowed to increase the splendor of her glory. She died March 24, 1603, and with her terminated the Tudor dynasty, after an existence of nearly 118 years. She was succeeded by James VI. of Scotland, first king of England of the Stuart line, who inherited the English crown in virtue of his descent from Margaret Tudor, eldest daughter of Henry VII., who had married his great-grandfather, James IV. The new king was hailed with much satisfaction by the English. The natural fondness of men for change had something to do with this, but it is but just to say that the question of the succession to the throne had been one of vital interest to the English from the time of the wars of the roses, and particularly since the successive wives of Henry VIII. had proved so unfruitful. Rulers and people alike had been deeply moved by the constantly impending danger of a disputed succession, and from the death of Edward VI. to that of Elizabeth, only two women of the main line were in existence, and for 44 years only one woman, Elizabeth herself. The anxiety that was felt for the marriage of Elizabeth was owing to this dread that haunted the minds of her subjects of all classes; so that when the sceptre passed quietly to the hand of a monarch who was descended from their ancient kings, who was not yet at the period of middle life, and who was the father of several children, a weight was taken from the English mind that had long oppressed it, and demonstrations of joy were common that by no means implied weariness of the Elizabethan rule. Had James been a man of ordinary capacity and common sense, he might have preserved this popularity, and laid deep the foundations of his dynasty, but he was a pedant, and a tyrant, without the courage which is necessary to maintain a tyranny. His person, his manners, and his actions were all against him; and before he had reached London his popularity began to decline, and was quickly exhausted. He commenced that course of policy which was destined to cause his house to become extinct in exile. The divine right of kings, so abhorrent to reason and to English ideas of government, was the basis of his conduct, and was made contemptible by his mode of proceeding. He perpetually claimed higher power than any Plantagenet or Tudor had claimed, but he invariably abandoned his ground when he was resisted. It has been sought to defend his course by stating that he was ignorant of the constitution and laws of England, and sinned without knowledge; but this excuse, which would be of little moment under any circumstances, is of none whatever in his case. His very first parliament, 1604, in reply to his first assertion that all their privileges were derived from him, asserted in full, and in the plainest language, all those principles for which the English constitutionalists contended against 3 generations of Stuarts, and asserted them as facts not to be questioned. Then began that civil contest which lasted down to 1689 in full force, and which was not utterly at an end until 1746. The foreign policy of James was as vicious as his home policy, and England became of less account in the European world than a second-rate German or Italian principality. Shortly after his accession, Beaumont, the French ambassador, prophesied that for a century England would hardly misuse her prosperity to any other purpose than her own injury, a prediction that came marvellously near to literal fulfilment. This was well, for if the Stuarts had known how to be popular kings the English constitution would have been destroyed; but, though generally men of ability, they seem to have delighted as much in annoying and degrading their subjects as in directly misruling them. James I. died in 1625, and was succeeded by his son Charles I., a monarch who had some elegant, gentlemanlike tastes, but who apparently could not conceive of any obligations on the part of a king to his subjects. He did not put forward his pretensions so offensively as similar ones had been put forward by his father, but he adhered to them with a courage and a tenacity that were utterly unknown to James. He set deliberately

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to work to introduce into England the system of government that prevailed in France, to do in England and Scotland what the Austro-Burgundian princes had done in Castile and Aragon. Even the wretched excuse of ignorance that has been pleaded for James cannot be used in behalf of Charles; for he had been educated in England from his early childhood, had good faculties, and had by his assent to the petition of right—an instrument, all its circumstances considered, even more important than Magna Charta—expressly agreed not to rule arbitrarily for a full and solid consideration paid into his hands. For 11 years (1629–'40) he called no parliament, and England was as despotically ruled as France; and had all his instruments been prudent and able men, it is possible he would have succeeded in his design. His chief instruments were Wentworth, after ward earl of Strafford, and Laud, archbishop of Canterbury; the former one of the ablest of men in an age singularly prolific in able men; the latter eqnally distinguished for his narrowness of mind. These two men, it should seem, were associated only that the wisdom of the one might be confonnded by the folly of the other. Land gave precedence to ecclesiastical tyranny, whereas Wentworth, if he had had entire management of affairs, would have established political despotism, whence religious uniformity would have soon followed. It is very doubtful whether the people could have been stirred up to the fighting point if their religious sentiments had remained without serions distnrbance nntil their political rights had been totally snbverted. The bigotry of Laud caused him to seek to fasten the English church polity on Scotland, which was met by that deep and determined resistance on the part of the Scotch which is so striking a trait in their character when their principles or prejndices are assailed. War between the Scotch people and the English government followed, and Charles was compelled to call a parliament, April, 1640. Thns were all Wentworth's sagacious plans set at nanght. The parliament, known in history as the short parliament, lasted bnt a few days, when it was dissolved, in the mere wantonness of tyranny. Six months later assembled the famous long parliament, which the king's necessity forced him to call. The parliament punished the king's tools, and forced him to admit that it should not be dissolved without its own consent. It then proceeded to divest the king of much of his power, demanding, among other things, control of the militia. It may be admitted, without any reflection on the memories of Pym and Hampden, and their associates, that the parliament party went beyond the limits of the constitution, in their desire to preserve the constitution. Their excuse is to be found in the purpose and acts of the king, and in his incurable falsehood. Yet they did not go so far as the men of 1688–'9 went, who set aside a dynasty in order to place the constitution beyond danger. It matters not that Charles was beheaded in 1649; we know that the political leaders of 1640–'42 never counted upon the king's death or deposition, and that at no time was it out of his power to have reigned in strength and peace, on the sole condition that he should rule as a constitutional sovereign. Had they set aside the dynasty, there would have been no occasion to change the constitutional practice; but that was impossible. It was natural that Charles should refuse to part with power that was legally his; and it was equally natural that the parliament should refuse to allow it to remain in his hands. Both parties appealed to arms, and what is known as the great civil war began in the latter part of 1642. At first fortune favored the king, whose wrong-headedness however rendered him unable to profit therefrom. Gradnally the radical party in parliament gained strength, and, under the lead of Vane, Cromwell, and others, rose to power. Cromwell was everywhere victorions in the field. Parliament was "purged" of all who showed any disposition to treat with the king. The army became the source of all power. The king was tried, condemned, and executed. Ireland was conquered by Cromwell, who was almost eqnally successful in Scotland. The battle of Worcester, Sept. 3, 1651, crushed the royalists for nearly 9 years. In 1653 Cromwell dissolved the parliament by force, and was master of England for 5 years, ruling the connty far more wisely than ever it had been ruled by a Stuart, but still with an iron hand, which he did not condescend to cover with a velvet glove. He would have ruled constitntionally if he could, but by him the English would not be so ruled. He wished to become king, but this the army would not allow, for it was composed of men who were sincere republicans, and who acted conscientiously. Yet England then occnpied the highest place she had ever known in the world's estimation; one in striking contrast to that which she had held during the 40 years of the rule of James I. and Charles I. After Cromwell's death, in 1658, dissensions broke out among the military, and the military and civil republicans quarrelled. Richard, the inferior son of the great protector, resigned, and thus was prepared the way for the restoration of the Stuarts, effected by Gen. Monk, in 1660. The reign of Charles II. dates from that year, May 29, in fact, though in law it dates from the day of his father's decapitation. The change was prodigions. The austere Puritans were succeeded by profligate cavaliers; but for this the former were most to blame. They had insisted upon ruling the nation into righteousness, and had caused that reaction which ended in the fonlest licentiousness. It has been truly said that the reign of the saints produced the reign of the harlots. Many of the reforms effected by the long parliament were preserved. That body had swept away the court of star chamber, the high commission conrt, and the council of the north, all tremendous instruments of royal tyranny, and not one of these was it possible to revive. Other good effects of the legislation of that great parliament were preserved.

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The nation had gone forward, and it was not possible for it to go backward, even under the effect of that singular reaction which caused usually sensible men to welcome back the profligate king with tears in their eyes. Had Charles II. been an ambitious monarch, he might have accomplished what his grandfather, his father, and his brother were unable to accomplish; he might have established despotism in England, at least for a time. But, though one of the ablest members of his family, he was singularly destitute of those feelings which ordinarily are found in monarchs. He loved his ease above all things, and if he could get pleasantly through the 24 hours he was quite willing that other men should do so. He had many of those qualities which are popularly attributed to his grandfather, Henry IV. of France; but he probably laughed at his ancestor's daring in the field. His vices were of the popular kind, and such as even moral men are ready to forgive in kings. From the 11th to the 30th year of his age his life had been passed amid civil disputes, wars, wanderings, and intrigues, and in poverty; and he had contracted from this experience a horror of every thing that looked like danger, or that was business. Happen what might, he is reported to have said, he would not again go on his travels. From the personal selfishness of this easy voluptuary England derived almost as much good as from the tyranny of John or the cowardice of James I. He was content to rule as much through parliament as could be expected from a monarch under no more restraint than he was. Several times, when more daring natures than his own had caused him to venture upon some despotic act, he was ready to give way when he found the opposition resolute. He retreated from the ground assumed in his declaration of indulgence, and so weakened the royal power. His popularity soon underwent a decline, which was principally attributable to the meanness of his foreign policy. With the restoration of the Stuarts was also restored that policy in foreign affairs which had reduced England to so low a state in their first two reigns. England's honor, it may be said, was gibbeted with Cromwell's body at Tyburn. An unnecessary war with the Dutch produced much disgrace. The triple alliance which was entered into with Sweden and Holland, and which for a brief interval stayed the course of Louis XIV., was the solitary act of the kind that reflects honor on this reign. The king, however, soon became the tool and pensioner of France. His forces assisted in the war on Holland made by Louis XIV. The unpopularity of this course, and the internal misgovernment of the cabal ministry, created a great change in English opinion, and finally assistance was sent to the Dutch. The peace of 1678 was followed by the excitement caused by the alleged popish plot, and for a time the king was almost as unpopular as his father had been in 1640. Parliament after parliament was elected, met, set itself in decided opposition to the government, and was dissolved. The leading object of the opposition was the exclusion of the duke of York from the line of succession; and even to this the king would finally have consented rather than have fought. But the reaction that set in saved him from the last disgrace. When the Oxford parliament was dissolved, in 1681, the king found himself hardly less powerful than he had been in 1660. He never called another parliament, but was able to govern without one. The conspiracies that were formed by the whigs (the names of whig and tory had their definite political commencement in 1680) were detected, and many of the conspirators were punished. Others, men of whom the government wished to be rid, such as Russell and Sidney, were judicially murdered. Few kings have been more powerful than Charles II. was during the last 3 years of his reign, yet some marked advantages had been obtained by the constitutionalists, which have endured. The *habeas corpus* act of 1679 was among the greatest triumphs of the liberal party, not only in itself, but because it furnished a point of union between whigs and tories; for in the next reign it was found that the tories, even when most servilely loyal, could not be prevailed upon to repeal that act. Charles II. died suddenly in Feb. 1685. James II. came to the throne without the slightest opposition, and for a brief period was popular. Though an open and avowed Catholic, he was beloved fanatically by the priesthood of the church of England, which indeed had saved his inheritance in the days of the exclusion bill. Had he been content with persecuting dissenters and whigs, and with destroying much of the civil liberty of his subjects, it is not unlikely that he would have made himself as powerful as Henry VIII. had been; but he wished to reëstablish the ascendency of his own church, which could not be done without overthrowing the Anglican church, and spoiling the aristocracy of much of their property, and thus he united church, aristocracy, and all the intelligent part of the people against him. The parliament he summoned was so servile that it is impossible to class it with those noble bodies which had done so much to vindicate the liberties of England. Even the parliament of 1660 seemed manly and liberal in comparison with it. Yet this servile body could not satisfy the king, and he broke with it on points that plainly showed he was bent on the establishment of a despotism, and the destruction of the constitution in church and state. Before this happened, he had put down the attempt of Monmouth to subvert the government, punishing the chief and his followers with a vindictiveness to which there are few parallels in history. So complete was the terror caused by these punishments, that not even the union of churchmen, dissenters, the aristocracy, the legal profession, and the middle classes of almost every faith, could have availed to effect his overthrow, had not that union been supported by a large foreign army, headed by a prince of the highest reputation as a soldier and a statesman. The king prorogued parliament in Nov.

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1685, and that body never met again. For 3 years he governed despotically, and there was a contest perpetually waged between him and his people; and the vigor with which the contest was fought on the popular side shows how well established was the English constitution. The king at first sought the aid of the church against the dissenters, and received it until the church found he meant its own destruction, together with that of all other forms of Protestantism, when it revolted, in spite of its passive obedience doctrines. He then sought an alliance with the dissenters against the church, and though some of them, as was but natural, were ready to aid him, the great majority of their number remained true to the constitution. By the autumn of 1688, the king was opposed by almost all classes of his subjects, and could not procure the services of even third-rate lawyers in an age proverbial for the baseness of its legal men. William, prince of Orange, had watched the contest in England closely. He was the king's nephew, son of his sister Mary, and had married the king's eldest daughter Mary, heir apparent to the British crown. It is not probable that he cared much for the liberties of England, for he was the chief of that party in Holland which was opposed to the existing constitution, a polity in its spirit not unlike to that of England; but he was firmly opposed to Louis XIV., and desired to have the aid of England in thwarting his schemes; and James was the pensioner and ally of Louis, and so would remain so long as he should persist in governing England illegally. While Mary of Orange stood next in succession to James, her husband could not do much in opposition to that king; but he let it be known that his sympathies and those of his wife were with the constitutionalists. James had married for his second wife Mary Beatrice, a princess of the house of Este of Modena, and from this union had proceeded 4 children, all of whom had died. It seems to have been taken for granted that this couple were to have no more children, and that in due course James would be succeeded by his daughter Mary; but in 1687 the queen was declared to be pregnant, and on June 10, 1688, was born that prince who was afterward known as the pretender. This incident precipitated matters, for the opinion was almost universal in England that a supposititious child had been placed in the position of heir apparent to the crown. June 30, 1688, William was invited to invade England at the head of an army. This invitation was signed by the earls of Shrewsbury, Devonshire, and Danby, by Lord Lumley, by Henry Sidney and Admiral Russell, and by Compton, bishop of London; and it was accepted. A variety of circumstances favored the undertaking, and on Nov. 5 William landed at Torbay, at the head of a well-appointed army, 15,000 strong, composed of men of several nations. At first the people were slow to join him, and after having advanced as far as Exeter, he talked of returning to his ships; but men of note now began to repair to his standard, and it was found that James had no hold even on the great army which he had established in defiance of law. He was deserted by those upon whom he ought to have been able to rely, even his daughter Anne joining his enemies. He gave way to terror, hastened to undo all he had done, and fled. Brought back to London, he fled a second time, and reached France, where he had previously sent his wife and son. All England was in the hands of William and his friends. The convention parliament that assembled, after much discussion, conferred the crown on William and Mary, which was a revolutionary act, as not only were James and his son alive, but Mary and Anne had claims to the crown compared with which those of William could not bear criticism. The declaration of right placed the ground of action on the vindication of the "undoubted inheritance of Englishmen," the entire movement being conservative in its character, and not one of innovation. The events of 1688–'9 are known as the English revolution, but it would be more correct to call them the close of that revolution; for the contest that had commenced with the coming of the Stuarts to the throne, and which had lasted for 86 years, was virtually closed on the day that William and Mary were proclaimed king and queen of England. For 170 years the government of England has been constitutional without question, a circumstance totally without parallel in the history of great nations. If we except the rebellions of 1715 and 1745, that country has been the scene of no serious outbreak against established authority for 5 generations. Faults there have been in both government and people, but not greater than are to be found in the corresponding annals of other European nations; while in no other country of the old world has the good that England has known had an existence. Liberty and law have gone hand in hand together, each sustaining the other, mutually imparting a portion of their spirit. Moral, intellectual, and material progress through 5 generations has made England the first of nations, and left her, in some important respects, without a rival. The greatness of England, her moral power, in no small degree her literature, and the fact that she is the mother of nations destined perhaps to excel herself, are all due to the happy settlement that was effected in 1688–'9, which was the completion, by one set of patriots, of what other patriots had initiated or forwarded. Macaulay, writing at the time when all continental Europe was agitated by the revolutionary convulsions of 1848, claimed, with the natural and just pride of an English statesman, that England's exemption from those convulsions was due to the wisdom of her leading men of the 17th century. "In our island," he says, "the regular course of government has never been for a day interrupted. The few bad men who longed for license and plunder have not had the courage to confront for one moment the strength of a loyal nation, rallied in firm array round a parental throne. And if it be asked

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what has made us to differ from others, the answer is that we never lost what others are wildly and blindly seeking to regain. It is because we had a preserving revolution in the 17th century that we have not had a destroying revolution in the 19th. It is because we had freedom in the midst of servitude that we have order in the midst of anarchy. For the authority of law, for the security of property, for the peace of our streets, for the happiness of our homes, our gratitude is due, under Him who raises and pulls down nations at his pleasure, to the long parliament, to the convention, and to William of Orange." William III. found his new throne any thing but an agreeable seat, but possession of it enabled him to combat Louis XIV. with ultimate success, though the war that England declared against France, in 1689, was marked by many reverses on the part of the former. It was terminated by the peace of Ryswick in 1697. Ireland was subdued almost as completely as she had been subdued by Cromwell more than 40 years earlier. There were several conspiracies formed against the new government, but they all failed, and many of the conspirators were punished. The bank of England was established in 1694. Mary died in 1694, and left William sole monarch. The freedom of the English press dates from 1695. Most of the legislation of this reign was of a liberal character, and would have been far more so if William's wishes could in all cases have prevailed. Much of the evil of those times grew out of differences in religious belief, and William was singularly free from bigotry, though few men have been more devout than he was. The toleration act, which has been pronounced by the highest authority as "that which most strikingly illustrates the peculiar vices and the peculiar excellences of English legislation of all the acts that have ever been passed by parliament," was adopted in 1689. The last years of William's reign saw him enter into two partition treaties with Louis XIV. to dispose of the immense dominions of the Spanish branch of the house of Austria, Charles II. being without heirs of his body. Louis violated the second treaty in 1700, and William would have made war on him, but circumstances prevented him; and there was every prospect that the entire Spanish monarchy would pass to Philip of Anjou without a serious struggle, when Louis threw the whole British nation into a rage by acknowledging the son of the exiled James II. king of Great Britain, James dying in 1701. William took advantage of this blunder, and was preparing for vigorous war when he died, March 8, 1702. The year before his death he had the satisfaction of seeing the finishing stroke put to the work of that revolution with the close of which his fame is indissolubly associated. In 1613 Elizabeth Stuart, daughter of James I., had wedded the elector palatine, Frederic V., who afterward became king of Bohemia, but who could neither keep his new kingdom nor preserve his old palatinate. The youngest child of this marriage was a daughter, Sophia, married to Ernest Augustus, first elector of Hanover. As early as 1689, William had been desirous of entailing the British crown on this lady, and the house of lords unanimously agreed to an amendment of the bill of rights to that effect. The commons unanimously rejected the amendment. While the two houses were conferring on the subject, a son, afterward known as duke of Gloucester, was born to the princess Anne. Neither house would give way, and the bill of rights was lost. The duke of Gloucester died in 1700, and in 1701 William's old plan was adopted. The crown was entailed on the electress Sophia. An act more revolutionary in its character was never passed by a legislative body. All the descendants of James II. and Charles I. were passed over, and the preference given to a granddaughter of James I., for the sole reason that she was a Protestant. There were then living 57 persons who had claims to the crown superior to those of the electress, according to the received ideas of the right of succession. William was succeeded by the sister of his wife, Anne, second daughter of James II. May 15, 1702, war was declared against France, that war which was illustrated by the deeds of Peterborough and Marlborough, and which lasted 11 years, when it was concluded by the treaty of Utrecht, in which the English are thought to have thrown away nearly all the fruits of their many victories. The war party had gone out of office, in consequence of the hostility of the church, and their successors were supposed to aim at the restoration of the Stuarts, though, at the most, this suspicion of Jacobitism could apply only to Bolingbroke. The union of England and Scotland was effected in 1707, the latter country being allowed to send 45 members to the house of commons, and 16 to the house of peers. Anne died Aug. 1, 1714, and the crown passed without a struggle to the house of Hanover. The reign of George I. was by no means a brilliant one. The rebellion of 1715, in behalf of the Stuarts, proved a failure, and the foreign movements for the same object were quite as useless. England allied herself with France, then ruled by the regent Orleans. The whigs returned to power, which they kept until the reign of George III. The South sea bubble caused great distress. Walpole's ascendency began with its explosion, though he had been in office long before that date. England was involved in war with Spain, and in 1718 won the naval victory of Cape Passaro. George I. died in 1727, and was succeeded by his only son George II., between whom and himself there had been bitter hatred. The new king, under the influence of his wife, Caroline of Anspach, continued Walpole in office, and that great minister was at the head of affairs until the beginning of 1742, baffling for years all the exertions of the most able and unscrupulous opposition that has ever existed in a free state. His principle of action was "to let well alone;" but as he thought things were well which it would have

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been better to improve, he failed in his duty to his country. He allowed himself to be forced into a war with Spain, which departure from his system was soon followed by his fall, though he retained his influence over the royal mind to the day of his death. His successors were whigs in principle, and there was no chance for the tories, as a party, under the first two monarchs of the Hanoverian line. War with France was added to that with Spain, growing out of the question of the Austrian succession. As a whole this war was one of the least glorious ever waged by England. In 1745–'6 the contest between the reigning dynasty and the remains of the Stuart party was brought to an end at Culloden, where the duke of Cumberland defeated Charles Edward. The cruelties with which the Jacobites were punished reflect discredit on the English name. The treaty of Aix la Chapelle in 1748 restored peace to Europe for a few years. The whigs continued to rule, headed by Henry Pelham, and after his death in 1754 by his brother the duke of Newcastle. The renewal of the war with France in 1755 led to considerable ministerial changes, and in 1757 was formed the celebrated Pitt-Newcastle ministry, which carried on the contest with great vigor; so that when George II. died, Oct. 25, 1760, his fleets and armies were everywhere triumphant. The foundation of the East Indian empire of England was laid at Plassey, June 23, 1757. French America was conquered at Quebec, Sept. 13, 1759. The victories of Minden and Crefeld atoned for the days of Laffeldt and Foutenoy. Hawke's victory over Conflans was one of the noblest exploits of the British navy. The victories of Frederic of Prussia were quite as much owing to English money as to German genius. Death arrested the policy which had produced such results. The new king, George III. (the first English-born prince who had been on the throne since 1714), grandson of George II., was by nature as despotic as the worst of the Stuarts, and, having been educated in principles utterly unfit to be held by a constitutional sovereign, he resolved to attempt the restoration of Stuart modes of government; and hence peace was his first object, not because he had any aversion to bloodshed, but that he might be at liberty to concentrate all his powers on the work of internal change. He got rid of Pitt and made peace, but not until he had waged a brief war with Spain, that country joining the French in the last stage of the contest. The treaty was held to be very disgraceful to England, but history hardly bears out contemporary opinion, though it certainly was unwise to give up such islands as Martinique, Cuba, and the Philippines. Scarcely more wise was it to retain Canada, whereby the English North American colonies were freed from any fears from French attacks, and any feelings of independence which they might have would be increased. Those colonies, however, would probably have been long in maturing the wish for separation from the parent country had they been well governed. With the exception of a few thoughtful men, the colonists were attached to the home government as sincerely as were the dwellers in Lancashire and Kent. The attempt of that government to tax them caused great indignation, and led to the American revolution, which ended in the dismemberment of the empire. The English in the last years of the war had to fight the Americans, the French, the Spaniards, and the Dutch. The peace of 1783 left England in a low condition, from which however she rapidly recovered. She had been fortunate only in the East, where the ability and unscrupulousness of Warren Hastings increased her power. Shortly after the conclusion of the war George III. became popular, and saw the party which he hated excluded from office. The new phase of toryism which manifested itself under the rule of the younger Pitt became the ascendant political principle of England for more than 40 years. When the French revolution broke out, the English ministry reluctantly engaged in the war that soon followed, a fact that is established by the total want of preparation that marked the condition of England in 1793. A portion of the aristocratic whigs, headed by Burke, were more anxious for war than were Pitt and his immediate followers. The war lasted, with two brief intervals, down to the summer of 1815, ending in the complete triumph of England and her allies. The exertions made by England were vast, though her actions were not always wise. Her fleets, led by Nelson, Jervis, Howe, and Duncan, achieved splendid victories over the French and Spaniards, and in the last years of the war her armies were greatly distinguished under the lead of Wellington and others. In 1812–'15 she was involved in war with the United States, growing out of the impressment and right of search questions. Her colonial and Indian dominions were much extended during the contest. On the other hand, she found herself burdened with a debt of $4,000,000,000, and her expenditures had been on the most gigantic scale. George III. lost his reason finally in 1810, and for more than 9 years his eldest son, afterward George IV., was prince regent, succeeding to the throne Jan. 20, 1820. After the restoration of peace in 1815, England entered upon a career of reform which has been more or less steadily followed ever since, and which, without causing any disturbance to society, has wrought important changes, and greatly improved the condition of the people. This reform at first related to commercial and legal matters, but soon reached to others which are considered to be more peculiarly political in their character. The high toryism of the government underwent a change, and on the death of Lord Castlereagh in 1822, that liberal course in foreign politics was commenced by England which has been substantially maintained until now, and promises to be permanent. The passage of the Catholic emancipation act in 1829, under direction of a ministry headed by Wellington and Peel, showed that religious bigotry was no longer to receive

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the direct countenance of government; and the proceeding was but the fulfilment of the spirit of the treaty by which Ireland had been united to Great Britain in 1801, and, her own parliament abolished, allowed to send members to the imperial parliament. George IV., who had begun life as a liberal in politics, opposed this act, but was compelled to yield to the pressure brought to bear upon him by the tory chiefs. He died the next year, 1830, and, having no legitimate children, was succeeded by his brother the duke of Clarence, as William IV., whose short reign was destined to be the time of more political agitation than had been known since the revolution. Immediately after he became king happened the French revolution of July, 1830, which was followed by outbreaks in other parts of Europe, especially in Belgium and Poland, against established authority. England felt the effect of these movements, and sympathized with the popular parties of the continent. Parliamentary reform had long been desired by many of her people, and from time to time efforts had been made to accomplish it, but rarely with spirit, and never with success. But in March, 1831, a reform bill was introduced into the house of commons by Lord John Russell, and after long debates in parliament and intense excitement in the country, caused by the opposition of the house of lords, a bill making extensive changes in the constitution of the house of commons finally passed in June, 1832, under the ministry of Earl Grey. The first reformed parliament, which met Jan. 29, 1833, contained an overwhelming majority of reformers. The dominant party however was too strong, and fell from its own weight. Irish troubles led to dissensions, and Lord Grey retired from office in 1834. He was succeeded by Lord Melbourne. Toward the close of the year Earl Spencer, father of Lord Althorp, died, causing a vacancy in the chancellorship of the exchequer, which Lord Althorp could not hold as a peer. The king, who had been watching for an opportunity to get rid of the whigs, took this occasion to dismiss the ministry. The government was committed to Sir Robert Peel, who formed a conservative ministry, and made a bold effort to retain power, though it is not probable he would have advised the king to the step he had taken in dismissing the Melbourne ministry, for there were not 200 men in the commons who would have preferred the conservatives to the whigs. Parliament was dissolved, and in the elections that followed the conservatives gained largely; but the reformers had a majority, so that, though 35 reformers voted for the Peel candidate for speaker of the house of commons, he was beaten by a majority of 10. Sir R. Peel continued in office until April 8, 1835, when he retired, having been repeatedly beaten on Irish church questions. His ministry had not lasted 5 months. Lord Melbourne returned to office, with many of his old colleagues. The king found himself forced to submit to the whigs, and he did so with as much grace as possible, and never made an open attempt to disturb them; but it is said he was prepared to do something against them when he was seized with that illness which proved fatal to him, June 20, 1837. He was succeeded by his niece, the princess Alexandrina Victoria, who took the title of Victoria I. She was the only child of Edward, duke of Kent, 4th son of George III. This event led to the separation of the crowns of England and Hanover, which had been worn by the same persons since 1714, the Salic law prevailing in Hanover. The queen was very popular when she ascended the throne, nor have 22 years produced any abatement of that popularity, the love of her subjects and the esteem of foreigners being fully justified by her conduct, which has ever been that of a humane and constitutional sovereign. She favored the whig ministry, which remained in office some 4 years after her accession, though often rudely shaken, and once compelled to resign for a few days. The elections held on the demise of the crown did not strengthen the ministry, and they ruled on sufferance. There was a near approach to war with France in 1840, in consequence of disputes on the eastern question. Could France have looked anywhere for an ally, war would probably have broken out; but all the great powers were arrayed against her, nearly as closely as they had been in 1815. In 1841 the long contest between the conservatives and the whigs came to a crisis, and after the latter had been more than once defeated, the house of commons declared its want of confidence in them by a vote of 312 to 311. Shortly afterward parliament was dissolved, and the subsequent elections ended in a complete conservative triumph. When parliament met, the ministers were beaten by 91 majority in the commons, and by 72 in the lords. They immediately resigned, and Sir R. Peel formed a conservative ministry, destined to destroy many things which conservatives held dear. The whigs, just before they had been expelled, had adopted the part of corn law reformers, and the voice of the country was beginning to make itself heard on this question of food. In many respects the minister showed himself a reformer. He freed many articles from duties, and in other ways approximated to the position of a free trader. The more intense conservatives were dissatisfied, but the course of events was too much for them. The famine of 1845 compelled the ministry to discontinue their support of the protection policy, and the anti-corn-law league received much aid from the potato rot. The minister resigned office, but was compelled to resume it, and to preside over the destruction of the corn laws, which were finally disposed of, June 26, 1846. The "league" was immediately dissolved. The Peel ministry had from the first experienced much difficulty in the management of Irish affairs. The Melbourne ministry had pursued a liberal course toward Ireland, and received the support of Mr. O'Connell and his friends; but when the conservatives came into office, the Irish leader, between whom

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and the premier the utmost personal dislike existed, resumed the work of "agitation." He brought forward the repeal question, and monster meetings were held in various parts of Ireland, at which enormous numbers were present. Government interfered to prevent one of these meetings at Clontarf, Oct. 8, 1843, with perfect success. Mr. O'Connell, one of his sons, and 8 other persons, were arrested on charges of conspiracy, sedition, and unlawful assembling. They were tried and convicted, and Mr. O'Connell was sentenced to a heavy fine and a year's imprisonment, and required to find high recognizances to keep the peace for 7 years. The case was carried before the house of lords, where 3 law lords voted for the reversal of the judgment of the lower court, and one (Brougham) to retain it (Sept. 4, 1844). The 3 were Lords Denman, Cottenham, and Campbell. Though nominally beaten, government was really victorious, as from that time Mr. O'Connell's influence was essentially diminished. In 1846 the Peel ministry brought forward an act to protect life in Ireland, but it was defeated in the commons on the same day that the corn laws were repealed, and the ministry came to an end, being succeeded by one at the head of which was Lord John Russell, which lasted down to the early part of 1852. The Russell ministry ruled England through the crisis of 1848–'9, and did not find the task difficult, because the constitutional principles on which the people had been so long governed had rendered revolution unnecessary. A weak attempt to get up an insurrection in Ireland was put down, and the chiefs in it were transported. The Russell ministry went ont of office in 1852, and for several months the tories, led by Lord Derby and Mr. Disraeli, were at the head of affairs. This ministry was followed by one composed of coalesced whigs and Peelites, headed by Lord Aberdeen. In 1853 the troubles on the Turkish question began, and war was declared against Russia by France and England, March 28, 1854. Large fleets and armies were sent to the East, and fleets to the Baltic. The Crimea was invaded, the victory of the Alma won by the allies, and Sebastopol partially invested. The Russians made great exertions, and having brought up large forces, fought the battles of Balaklava and Inkermann, losing them both. They were more successful in defending Sebastopol, the allies' attacks on which proved total failures. Winter set in, and great sufferings were experienced by the besiegers. Alarming accounts of the condition of the army were furnished to the London newspapers by their correspondents, and were corroborated by private letters. Though the allies had destroyed Bomarsund, in the Aland islands, their expedition to the Baltic had failed. Much irritation existed in England, under the effect of which the Aberdeen ministry broke down, and was succeeded by one at the head of which was Lord Palmerston, from whom the people expected as much as their ancestors had received from Pitt a century earlier. The war was continued in the Crimea during the winter, but little progress was made in the siege. In the spring increased vigor was infused into operations, and some brilliant successes were achieved; but on June 18 both French and English were repulsed in attempting to storm the Malakoff and the Redan. Lord Raglan, the English commander, died soon after, and was succeeded by Gen. Simpson. Preparations for a final attack were now made, and in September the city was subjected to the most terrible cannonading known in the history of war. On the 8th the French stormed the Malakoff, but were beaten on all other points of attack, while the English failed before the Redan. The Russians abandoned southern Sebastopol, retreating to the north side, whence no serious effort was ever made to dislodge them. They submerged their fleet, and they and the allies destroyed what was left of the town, and its fortifications and splendid docks. Kinburn was taken by the allies, and Kars was taken by the Russians. But the war was now virtually at an end, and peace was restored by a congress of the great powers at Paris, in March, 1856. England reluctantly made peace, her people having entered upon the war with the determination to put an end to that supremacy which Russia had exercised over Enrope since the fall of Napoleon. The war had served to show her power and her credit, and it had also exposed some of her weaknesses. It was as well for her, however, that peace was restored, for not much more than a year after that event, and while engaged in hostilities with Persia and China, a conspiracy was forming in her great Bengal army of sepoys, which broke out in Jan. 1857, and was attended with circumstances that shocked the world. Delhi, the old capital of the Moguls, fell into the hands of the sepoys, and the nominal Mogul emperor found himself once more a sovereign in reality. The mutiny spread rapidly, and in a short time the whole Bengal army had become, with few exceptions, an army as hostile to the English as those which had fought against them at Wandiwash and Assaye. The particulars of the contest that followed, and which in less than 2 years led to the reëstablishment of the English ascendency, this is not the place to relate. Suffice it to say that they showed the idleness of the assertions that England had become powerless, and that the skill, valor, and endurance of her people had declined. Her military reputation, which had been lessened in the eyes of many by the events of the Russian war, was greatly raised by the successes of her armies in India, and the valor and fortitude displayed on almost every critical occasion by her sons; while the statesmanship that was exhibited in the Punjaub showed that it is in her power to rule India with wisdom, firmness, and humanity. In 8 months after the breaking out of the mutiny, there were nearly 70,000 effective English troops in India,

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and new native corps had replaced the sepoys. By the end of 1858, this formidable revolt was totally suppressed, and the few mutineers that remained were reduced to the condition of wandering brigands. Major-General Sir Henry Havelock particularly distinguished himself in this war, but did not live to see its conclusion. After defeating the sepoys in 9 pitched battles, he died at Lucknow, Nov. 25, 1857. The war was concluded by the generalship of Sir Colin Campbell, who was raised to the peerage as Baron Clyde for his services. The government under which measures so thorough had been initiated became, however, unpopular, because it was supposed to be too subservient to that of France. A hostile vote in the house of commons in Feb. 1858, drove the Palmerston ministry from office, and a new conservative ministry was formed, with the earl of Derby as premier, and Mr. Disraeli as chancellor of the exchequer. A new reform bill was brought forward by this ministry in Feb. 1859. It was not acceptable to the friends of reform, and was defeated in the house of commons, March 31, 1859. Parliament in consequence was dissolved, and an appeal made to the country. The result of this election was a considerable gain to the Derby ministry.—*English Constitution.* The English constitution, which the English people are accustomed to speak of as the envy of other nations, is very ancient, though the present constitution is to that under which England "flourished 500 years ago, what the tree is to the sapling." The commencement of the English polity must be looked for in the time of the Roman occupation of the island, for that occupation was not only important in itself as a grand civilizing agency, but it had its effect on those Germanic conquerors whom we call Anglo-Saxons. The theory that the Saxons, while destroying the male Britons, spared and married their women, is plausible, and is supported by the fact that something of the same kind has been done by other conquerors under similar circumstances. This would give to England an important Celtic element. The invaders probably occupied the Roman towns, though a high authority (Kemble) is of opinion that they allowed those towns to perish. The conversion of the Anglo-Saxons to Christianity was an important step toward their civilization, and developed those ideas of order and law which belong to the race of which they were members, in an eminent degree. They were gradually forming a Christian state, when the arrival of the Danes gave a new turn to events, and contributed in making that England which the Normans seized in the 11th century. The Danish element was favorable to the production of a free state. All the circumstances of England during the 6 centuries that followed the Roman abandonment of the island tended to the formation of the polity which now exists there, and which was first clearly pronounced in the 13th century. Both the aristocratic element and the democratic element entered into the Saxon polity, the former attaining to a decided predominance. The free classes were divided into thanes and ceorls, the former being nobles and gentry, and the latter the mass of the people. The possession of property determined the position and rights of the freemen. The thralls were slaves, but are supposed not to have been numerous. The local organizations regulated for the most part their own affairs. The country was divided into counties, the counties into hundreds, the hundreds into tithings. The county courts, and those of the hundreds, were popular tribunals. The witenagemote was the highest assembly, and was thoroughly aristocratical in its character. The king presided in it, and it met by his summons. The earls—nobles by birth, as the thanes were from possession of property—attended it, and so did bishops and abbots. The thanes, too, had the right to sit in it. The local magistrates are supposed to have been occasionally present. The people had no part in it, and were not represented. It made laws, and voted taxes when they were needed. It controlled the king, and could elect him from among the members of the royal line. It was the highest court in all cases. The clerical influence in it was great, as it was throughout the country. The idea that the witenagemote was the original of parliament, though once entertained, is now entirely given up; yet it is apparent that it had some of the elements of parliament, and that its existence was not without effect in helping to form the polity that now exists. The Saxon aristocracy increased their power as time went on, and many believe that if the Normans had not conquered England that country would have seen all power pass into the hands of the great nobles. The higher earls were fast becoming rulers of the state, when they and the peoples, Saxon and Danish, were all subdued by another northern race, which had materially changed its character by a long residence in France. The conquest effected great changes in England. The feudal system was unknown there previous to that event, though the elements of feudalism were not altogether absent from it. William I. introduced this system into England, but with such modifications as prevented the sovereign from being enslaved by the nobility. This he could not have done had he found feudalism existing in the island, for in that case he would have had to conform to the general character of the system. The theory that the king of England is the supreme lord of all the land, which exists now, and has existed for nearly 8 centuries, was established by the conqueror. This supremacy was directly and solemnly admitted by all the landed men of England in 1086, in an assembly at Salisbury. All took the oath of fealty, and did homage. The lands the king conferred on his followers were scattered over the country, so that it was impossible for his tenants *in capite* to increase into territorial potentates, such as existed in France

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and elsewhere on the continent. He kept up the Saxon courts, but withdrew from the county court cognizance of ecclesiastical matters. These popular courts were made more popular by William than they had been under the Saxon kings. The king's courts were also important tribunals. This judicial system tended to keep down the baronial courts, which were always of inferior rank to the baronial courts of the other European countries. The English barons themselves never attained, in any respect, to the consequence which barons achieved elsewhere. Half the people were slaves, living in villeinage. Those attached to the soil, like Russian serfs, were villeins *regardant*, while the others, who could be disposed of like the negro slaves in our southern states, were villeins *en gros*. The number of the latter was not large. This state of things was brought about in the 90 years that followed the conquest, and was the result of the Norman rule, the English peasants being reduced to the condition of those of Normandy. In the reign of Henry II. the work of redemption began, and for 7 centuries progress has been the law of England, though sometimes it has been very slow in manifesting itself. Judicial interpretation was favorable to the enslaved classes. At the beginning of the 13th century there was a class of free laborers in England, small in numbers, but embracing the humbler people of the towns, and some of the peasants. The free peasant, no matter how complete his poverty, was compelled to be enrolled in the *decenna*, or subdivision of the hundred to which he belonged, and performed certain political duties of a local nature. He could act on inquests or juries. The landholders were tenants in chivalry, or holders by military tenure, and included the barons and other great men holding immediately of the crown, and whose burdens were as great as their honors; tenants in free socage, who have been compared with the modern yeomanry, and whose condition was as good as that of any class of men in that time; and tenants in villeinage, men who had been emancipated, and who continued to reside on their old places, rendering their old services, or freemen who had taken their places on the condition of discharging their obligations. There were not many of this last class of holders at the commencement of the 13th century. The conquered towns had passed into the hands of the Normans, but had managed to obtain a certain degree of freedom, by purchase, and also by charters, yet were liable to be specially taxed for the benefit of their lords. Such was the condition of England when John became king, and carried the ordinary Norman tyranny to an extent that never was thought of by any of the preceding kings. A council of barons and prelates was held in 1213, at which Langton, archbishop of Canterbury, brought forward a charter of Henry I., which was well received. Another council was held in 1214–'15, which extorted Magna Charta from the king. The charter itself is dated June 15, 1215 but the conference was not concluded until the 19th. The great charter, one of the landmarks of the history of freedom, laid the foundation of the English constitution in its broad and definite sense. It was renewed, with some omissions, in the reign of Henry III., who also granted the charter of the forest, modifying the forest laws of the country. These charters were renewed 5 times in the same reign. The charter of Henry III. has been 30 times confirmed. The most remarkable of these confirmations was in the 25th year of Edward I. The government, as established in the 13th century, provided for a hereditary monarch with limited powers, taxation by parliament, punishment to be inflicted only after lawful trial, the cessation of arbitrary fines and imprisonment, trial by jury, and justice without price or delay. Parliament attained to the distinctive character which it has had for 595 years in 1265, when borough representation was created. Knights of the shire were earlier summoned to the great council, which was called parliament in 1246. It was the intention of those who framed Magna Charta that cities and boroughs should be represented, but 50 years elapsed before their plan was carried out. Councils without burgesses continued to meet for some time after the establishment of parliament. That England obtained a symmetrical constitution in the 13th century, or that she has ever had any thing of the kind, is not pretended by the most partial vindicators of her polity; but it is claimed, with strict justice, that then she became distinctly a free state, and that since that time she has been able to maintain liberty and order to an extent, and for a length of time, unknown to any other country. Monarchs and ministers frequently disregarded the restraints placed on them by the laws, but not even the most arbitrary of kings or the most reckless of ministers has ever dared to go beyond a certain line, save to be destroyed. The constitution continued to develop itself, and early in the 14th century we find the house of commons a great admitted power in the state. In the reign of Edward III. this body complained of the conduct of the king's ministers, and in 1376 the first impeachment took place, applying to 6 persons, 2 of them peers, who had been employed in the fiscal department. In the affairs of war and peace the commons were then frequently consulted. It was provided that there should be frequent sessions of parliament, and 48 were held in the reign of Edward III. The minority of Richard II., and his weakness when he became of age, favored the growth of the power of the commons. That king sought to "pack" the house in 1398, a plain proof of its consequence. Parliament aided to depose Richard II., and to confer the crown on Henry IV., over the superior claim, in a legitimate sense, of the line of Clarence. Hallam, speaking of things as they were at the close of the 14th century, says: "Of the 3 capital points in contest while Edward III. reigned: 1, that money could not be levied; 2, or laws enacted

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without the commons' consent; and 3, that the administration of government was subject to their inspection and control—the first was absolutely decided in their favor, the second was at least perfectly admitted in principle, and the last was confirmed by frequent exercise." In the 9th year of Henry IV. it was recognized that all money bills must originate in the lower house, and that the king should not take cognizance of the subject of that body's deliberations until it had decided upon it, and brought its decision before him regularly. Freedom of speech was reluctantly allowed by the sovereign, and Henry IV. did what he could to prevent it; and in the reign of Henry VI. a member of the commons was imprisoned because of a motion he had made; but as that motion related to the succession to the throne, and was made not long before the outbreak of the wars of the roses, perhaps the severity exercised toward him was owing to the jealousy which the Lancastrians felt toward the Yorkists. Members were then first privileged from arrest. Laws were passed to lessen the influence of the crown in elections, and to determine the qualifications of voters and representatives. At this time the desire to enter parliament was commonly felt, whereas in the preceding century it had been found necessary to enforce the election of representatives, while electors complained of the burden of paying members. The wars between the houses of York and Lancaster raised the consequence of the house of commons, as each party had to appeal to that body, and employed the power of parliament against its enemies. In 23 Henry VI. it was sought to provide that knights of the shire should be of gentle birth, but the law could not be enforced. Had this passed into practice, and become a portion of the constitution, the course of English history must have been entirely changed. It is owing to that liberal character of her aristocracy that England is both aristocratical and liberal in her government. There was in England, in the 15th century, "a strong hereditary aristocracy; but," says Macaulay, "it was of all hereditary aristocracies the least insolent and exclusive. It had none of the invidious character of a caste. It was constantly receiving members from the people, and constantly sending down members to mingle with the people. Any gentleman might become a peer. The younger son of a peer was but a gentleman. Grandsons of peers yielded precedence to newly made knights. The dignity of knighthood was not beyond the reach of any man who could by diligence and thrift realize a good estate, or who could attract notice by his valor in a battle or a siege. It was regarded as no disparagement for the daughter of a duke, nay, of a royal duke, to espouse a distinguished commoner. Thus Sir John [Sir Robert] Howard married the daughter of Thomas Mowbray, duke of Norfolk. Sir Richard Pole married the countess of Salisbury, daughter of George, duke of Clarence. Good blood was indeed held in high respect, but between good blood and the privileges of peerage there was, most fortunately for our country, no necessary connection. Pedigrees as long, and escutcheons as old, were to be found out of the house of lords as in it. There were new men who bore the highest titles. There were untitled men well known to be descended from knights who had broken the Saxon ranks at Hastings, and scaled the walls of Jerusalem. There were Bohuns, Mowbrays, De Veres, nay, kinsmen of the house of Plantagenet, with no higher addition than that of esquire, and with no civil privilege beyond those enjoyed by every farmer and shop-keeper. There was therefore no line like that which in some countries divided the patrician from the plebeian. The yeoman was not inclined to murmur at dignities to which his own children might rise. The grandee was not inclined to insult a class into which his own children must descend." Had the plan to confine county representation to persons of gentle birth been successful, this liberal state of things must have come to an end, and the English aristocracy have degenerated into a mere oligarchy, to have been in its turn subdued by some powerful king. It was owing to the general liberality of the English system of 400 years ago that the plan failed, the law falling into desuetude, and the course of England's development being left without a check. It would, however, be wrong to infer from the real power and great consideration of parliament, that the king was not a sovereign of the first rank. He was very powerful, and did many things which we, with our modern ideas of law and regularity, find it very difficult to reconcile with the idea of the chief of a constitutionally governed country. Much depended on personal character, but even the weakest of kings possessed great prerogatives, and found not much difficulty in occasionally evading or violating the law, without causing public commotion. With 3 or 4 exceptions, all the English sovereigns that reigned between the days of Hastings and Bosworth were men of distinguished talents and much energy; facts that explain why it was that the liberal principle made no greater progress, and also show how earnest the English must have been in laboring for free institutions, which could have been gained by no ordinary means from monarchs of such abilities, and who were naturally averse to every thing that tended to lessen their authority. The belief, once so common, that the Tudors established a despotism in England, and that for 3 generations and more the polity of the country became less liberal than it had been under the Plantagenets, cannot now be justly entertained. There were great changes made in various respects, but that the government was as arbitrary as has often been stated is not the fact. It had that appearance because those intrusted with it were careful not often to go further in their exactions than public opinion would warrant their going. "In the house of commons, then as much as now," says Froude,

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"there was in theory unrestricted liberty of discussion, and free right for any member to originate whatever motion he pleased. But so long as confidence existed between the crown and the people, these rights were in great measure surrendered. The ministers prepared the business which was to be transacted; and the temper of the houses was usually so well understood that, except when there was a demand for money, it was rare that a measure was proposed the acceptance of which was doubtful, or the nature of which would provoke debate. So little jealousy, indeed, was in quiet times entertained of the power of the crown, and so little was a residence in London to the taste of the burgesses and the country gentlemen, that not only were their expenses defrayed by a considerable salary, but it was found necessary to forbid them absenting themselves from their duties by a positive enactment." Henry VIII., writing to the pope in 1529, said: "The discussions in the English parliament are free and unrestricted; the crown has no power to limit their debates, or to control the votes of the members. They determine every thing for themselves, as the interests of the commonwealth require." Henry had a motive to make the pope believe in the power of parliament, but he was too sensible a man not to be aware that the papal court had excellent intelligence, and that it would be the extreme of folly to attempt to impose upon it. Throughout the entire existence of the Tudor dynasty there were instances of the sovereigns retreating from positions they had assumed when they found they had done what was unpopular; and they retreated so well as always to save their dignity, and to prevent their prerogatives from being called in question. The resistance which the Tudors experienced when they endeavored to tax their subjects too highly can leave no doubt that the power of the people was as great as ever it had been, and that the new dynasty, whatever else it succeeded in changing, did not effect any change in the English character. They certainly bore hard upon the aristocracy, but this rather helped them with the people. The peerage was not then extensive. Frequent mention has been made of the first parliament of Henry VII. having contained but 29 temporal peers, while in the parliament of 1451 there had been 53 such peers; from which it has been inferred that the aristocracy had been nearly annihilated in the wars of the roses. Unquestionably it had suffered immensely in those wars, which were contests between aristocratical factions, but there was abundant material from which to have filled the house of peers, had the king been desirous of filling it. The Tudors greatly changed the character of the aristocracy, not only by striking down many of the noblest of its members, as the Roman emperors had served the relics of the republican aristocracy, but also by elevating men from among the gentry and lawyers. The names of Russell and Seymour are now among the noblest in England, but they were not noble until the time of Henry VIII., or later. The Dudleys then rose to note. But whether new or old, the aristocracy were the true serviles of the Tudor times, not the people. One of the proofs that the parliament was not a feeble, inconsequential body even under Henry VIII., the most arbitrary of all the Tudors, is to be found in the use which he made of that body on many occasions. That monarch, as Bolingbroke says, "by applying to his parliaments for the extraordinary powers which he exercised, and by taking these powers for such terms and under such restrictions as the parliament imposed, owned indeed sufficiently that they did not belong of right to the crown. He owned likewise in effect, more than any prince who went before him, how absolutely the disposition of the crown of England belongs to the people of England, by procuring so many different and opposite settlements of it to be made in parliament." It has been observed that the increased weight of the commons in the Tudor reigns is proved by the desire of the government to obtain victories at elections. New boroughs were then created for the express purpose of adding to the government's influence in the house of commons, and to this action is attributed the irregularities that have existed in the popular representation of England. Government interfered in elections, and bribed members of the house. Henry's daughter, Mary, dissolved two parliaments, because they would not do what she desired; and the third was not always compliant. The abbey lands could not be restored to the church, nor the English crown settled on Philip II., because of the hostility of parliament to both schemes. These facts, and others that might be quoted, show that the government of the Tudors was not altogether of that despotic character that it has often been represented. They were more arbitrary sovereigns than the Plantagenets, and they carried much further than their predecessors the usurped jurisdiction of the court of star chamber. That famous tribunal interfered with the common course of justice so far as well nigh to hold all authority, and nearly destroyed the value of trial by jury by its arbitrary treatment of honest jurors. The reformation had great political effects, the chief of which was the increase of the power of the crown. Henry VIII. was pope of England for a time as well as king. His ecclesiastical supremacy was exactly what the words mean; but this was owing to circumstances and to his personal character, and his system died with him. When the Anglican church was finally established under Elizabeth, the sacerdotal character of the sovereign was disclaimed; but she had a vast power over the church in her hands, the ecclesiastical jurisdiction of the crown being complete. "The act of supremacy," says Hallam, "empowered the queen to execute it by commissioners appointed under the great seal, in such manner and for such time as she should direct; whose power should extend to visit, correct, and amend all heresies, schisms,

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abuses, and offences whatever, which fall under the cognizance and are subject to the correction of spiritual authority." After several temporary commissions had sat under this act, the high commission court came into existence in 1583. A more arbitrary tribunal never existed, and it is easy to see that men should suppose it could be favored only by a despotic government. Burleigh opposed the procedure under it, but, influential as he was, his opposition availed nothing. The house of commons was hostile to the high ecclesiastical party, and the tone which its opposition took was not that of a servile body. Yet it is from the pen of one of the worst of the bishops that we have the clearest proof of the nature of the English government in the 16th century, to the point that it was not arbitrary. "The regiment of England," says Aylmer, afterward bishop of London, "is not a mere monarchy, as some for lack of consideration think, nor a mere oligarchy, nor democracy, but a rule mixed of all these, wherein each one of these have or should have like authority. The image whereof, and not the image but the thing indeed, is to be seen in the parliament house, wherein you shall find these three estates: the king or queen which representeth the monarchy, the noblemen which be the aristocracy, and the burgesses or knights the democracy. If the parliament use their privileges, the king can ordain nothing without them; if he do, it is his fault in usurping it, and their fault in permitting it. Wherefore, in my judgment, those that in King Henry VIII.'s days would not grant him that his proclamation should have the force of a statute, were good fathers of the country, and worthy commendation in defending their liberty." This was written in 1559, the 1st year of Elizabeth and the 74th of the Tudor rule; and it is not possible that it could have been written had England been despotically governed by the Tudors. To the same purport are the observations of a far greater writer of the Elizabethan time, made in its last days. "I cannot choose," says Hooker, "but commend highly their wisdom, by whom the foundation of the commonwealth hath been laid; wherein, though no manner of person or cause be unsubject unto the king's power, yet so is the power of the king over all and in all limited, that unto all his proceedings the law itself is a rule." Hallam sums up the whole subject by saying that the English constitution under the Tudors "was a monarchy greatly limited by law, but retaining much power that was ill calculated to promote the public good, and swerving continually into an irregular course, which there was no restraint adequate to correct. It may be added, that the practical exercise of authority seems to have been less frequently violent and oppressive, and its legal limitations better understood, in the reign of Elizabeth than for some preceding ages." Hence, when the house of Stuart succeeded to that of Tudor, it did not become the head of a despotically governed state, but of a constitutionally ruled kingdom. The contest that then commenced, the opening scene of the English revolution, was the work of the government, and the revolutionary party consisted of that government and its adherents. The "country party," as the opposition came to be called, was, in the strictest sense of the word, a conservative party; and if, in the course of the long struggle of 86 years, it had occasional resort to acts of an apparently revolutionary character, it was only because they were necessary to the success of the one object it had in view, namely, the preservation of the liberties of England. In England, as afterward in America, the security of liberty was found compatible only with the removal of that government which had assumed the destructive part, and which would have overthrown the last of those constitutions of which there had formerly been so many in Europe, the English constitution being only one of a large family of similar polities, and the last survivor of them. The divine right theory, which was so zealously preached in the reign of James I., was meant to prepare the way for the subjugation of the people, and for the concentration of all power in the hands of the central authority. Charles I. was bent upon not being a Venetian doge, and some really able modern writers have written as if they believed there was a close resemblance between a king of England, who had only to rule according to law and his oath, and the shadowy phantom, that did not even play at ruling, on the Adriatic. A very great measure of power has always been wielded even by the most constitutionally inclined English monarchs, and popular feeling has often been with such kings against the aristocracy, but always on the condition that the king ruled according to law, a fact that it was impossible for Charles I. to comprehend. The contest was for power over the purse; which secured, power over the sword followed as of course. The 3d parliament of Charles I. passed the Petition of Right, an instrument superior to Magna Charta itself, and to which the king gave his consent. In it are pointed out the breaches that had been made in the law, the constitutional rights of Englishmen are declared, and the king is prayed to rule legally. Even if there had been a despotism in England previous to 1629, it ought then to have come to an end, after king and parliament had solemnly agreed upon the terms on which the government should thereafter be carried on. Yet the king violated the Petition of Right in the most flagrant manner, and did not call a parliament for 11 years, which was unprecedented. During that time, England was as arbitrarily governed as France by Richelieu, without having any glory, like that which Richelieu's foreign policy was gaining for France, to gild her chains. The machinery of despotism was found to be perfect within certain limits, and those by no means narrow ones. The jurisdiction of the court of star chamber was very great, and the proceedings in that court were

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more numerous and violent than they had been under the Tudors; and "the object of drawing so large a number of criminal cases into the star chamber seems to have been twofold: 1, to inure men's minds to an authority more immediately connected with the crown than the ordinary courts of law, and less tied down to any rules of pleading or evidence; 2, to eke out a scanty revenue by penalties and forfeitures. Absolutely regardless of the provision of the great charter, that no man shall be amerced even to the full extent of his means, the councillors of the star chamber inflicted such fines as no court of justice, even in the present reduced value of money, would think of imposing." The cruel, atrocious punishments inflicted by the star chamber are as well known as the sentences passed at the bloody assizes. The council of the north, which had been created by Henry VIII., but which for 96 years had comparatively limited powers and jurisdiction, was converted into a star chamber for all that part of England which lies between Humber and Tweed. Wentworth, the president of this council, contrived to make it even worse than it would have been under the presidency of any other man. Proclamations were frequently resorted to, and were made to have the force of law. They intermeddled with almost every department of life, to the great grievance of the subject. Yet nothing can be clearer than their unconstitutionality; and until the Stuart age they were but little known. James I. made them common, and his evil example was outdone by his successor. The case of ship money has attracted extraordinary attention, which is in part due to the character of Hampden; but it was one then calculated to excite all men's attention in itself, for it showed that no dependence could be placed on the common law courts, and that those tribunals were nearly as bad as the irregular tribunals which Charles, and Wentworth, and Laud employed to plunder the property, to restrict the liberty, and to mutilate the persons of Englishmen. "Ship money," says Hallam, "was held lawful by Finch and several other judges, not on the authority of precedents, which must in their nature have some bounds, but on principles subversive of any property or privilege in the subject. These paramount rights of monarchy, to which they appealed today in justification of ship money, might tomorrow serve to supersede other laws, and maintain new exertions of despotic power. It was manifest by the whole strain of the court lawyers, that no limitations on the king's authority could exist but by the king's sufferance. This alarming tenet, long bruited among the churchmen and courtiers, now resounded in the halls of justice." A reconciliation was sought with Rome, and Catholic troops were to be employed to control the Scotch and English. Even had there been no religious grievances to complain of, the political grievances were so vast and so various, that they would have justified a resort to arms on the part of all who cared for constitutional government. But there were religious grievances in abundance, though so "thorough" had been the repression exerted by Laud, that he could report to his master a most happy absence of nonconformity in 1639, "on the very eve of a revolution, in which primate and church, and monarch and monarchy, were to perish together." The religious element had much to do with bringing about the contest that commenced in 1640. The 4th parliament of Charles I. met in April, and was soon dissolved; and 6 months later met the most memorable parliament that ever assembled. That parliament fought the battle of the constitution, and fought it successfully. The entire machinery of despotism was broken down, most of it never to be rebuilt. The star chamber, the council of the north, and the high commission court disappeared from England, the first two forever, and the last to be only temporarily revived by James II. This would have ended the quarrel could the king have been trusted. But to trust him was quite out of the question, and parliament, to preserve the freedom of the country, had to resort to measures which were unconstitutional, according to the letter of the constitution, but perfectly in keeping with its spirit. The king was forced to agree that parliament should not be dissolved without its own consent, which was an invasion of his prerogative; and later it was resolved that no minister should be appointed or peer created without the consent of parliament, and that the king should be made to resign the supreme military authority, which he justly held to be the very flower of the crown, and which was unquestionably one of its most ancient attributes. This conduct, indefensible on mere technical grounds, was proper in reference to the object had in view, which was to put an end to illegal government by the king, who had repeatedly proved himself incapable of keeping his word. War soon broke out, and the king was supported by a large number of constitutionalists, men who were prepared to maintain the government as it was after the early reforms of the long parliament had been accomplished, but who dreaded innovation. Had they been successful, the constitution would assuredly have been destroyed, though nothing was further from their intention; while the innovating party were pursuing the only course that could lead to its preservation. The war led to the suspension of the constitution, and the protectorate of Cromwell was mainly a government by the sword, in spite of the fact that the protector sincerely wished to rule as a constitutional monarch. In 1660 the house of Stuart was restored, but unfortunately without any thing having been done to secure the enjoyment of legal rule. The old polity came once more into full force. The government was what it had been, nominally, before Charles I. and parliament appealed to the sword, so that the star chamber and high commission courts, and other institutions of tyranny, no longer had place in England. Tenures by knight service were abolished, and most

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of the soil of England was held under that tenure. The parliament of 1661, which lasted down to 1679, was fanatically attached to royalist principles, and to its fanaticism must the bad government of Charles II. in no small degree be attributed. His reign is one of the worst in English history, but his first parliament was as bad as the king. Yet in that reign much was done that had permanent effect on the constitution. The dispensing power was condemned by parliament, and its illegality admitted by the king himself. The test act was passed. The *habeas corpus* act, which supplied a proper system of procedure to preserve the liberty of the subject, was adopted, and received the support of all Englishmen who were not anxious to see despotism established. Parliament made war or peace at its pleasure. It was now obvious that not only had parliament become the chief power in the state, but that the house of commons was virtually parliament. To counteract this, the king adopted a plan recommended by Sir William Temple. He created a new council, or extended the privy council to 30 members, 15 of whom were to be the chief ministers, while the others were to be nobles or gentlemen, without office, but of wealth and consideration. It was expected that this council would satisfy all parties, but it satisfied nobody, and failed from the commencement of its existence. The old form was soon restored. A tory reaction made the calling of parliament together unnecessary in the last years of Charles II. His successor, James II., not content with an amount of power such as no other sovereign of his line had possessed, entered upon a course of action that plainly showed he had in view the total overthrow of the constitution both in church and state; and as his stanchest supporters had been churchmen, all parties in England were soon arrayed against him, except a few Catholics and a small portion of the dissenters. He had called a parliament immediately after his accession, and though it was the most servile body that had met for 80 years, and the king had said there were only 40 members of the house of commons whom he would not have named himself, he soon quarrelled with it. The ends which he had most at heart were, the repeal of the *habeas corpus* act, the establishment of a standing army, and the repeal of all laws that were directed against the Catholics. It so happened that these three things were precisely those which his own friends, the tories, were least inclined to grant. They were as much attached to the *habeas corpus* act as were the whigs; they associated the idea of a standing army with the military rule of Cromwell; and they saw ruin to the church of England in relief to the Catholics, and the one thing which they loved better than either monarch or monarchy was that church. For 3 years James carried on a warfare against the constitution, reviving the high commission court by his own act, and in defiance of acts of parliament, and in various other ways showing his utter contempt of all restraint. The events of 1688–'9 removed him from the throne, set aside the direct line, and placed the constitution on a firm basis, on which it has rested without serious disturbance for 170 years. The government of parliament was then fairly acknowledged, and has never since been called in question. Even when George III., who in personal character had much resemblance to the Stuarts, and who would have been a king after their pattern if he could, resolved to rule as well as to reign, he sought to realize his design through the aid of parliament. Practically, too, parliamentary rule means the rule of the house of commons. The house of peers occupies a high place in the state. Within certain limits its power is by no means small. On general subjects it is at liberty to dissent from the commons but when the people are really determined upon carrying a political measure, the peers have to give way, no matter what may be their opinions as to its justice or expediency. A remarkable instance of this working of the English system was seen in 1832, when the reform bill was forced through the upper house, though it was notorious that a large majority of its members were opposed to the bill. In the reign of William and Mary, and of William III., many things were done to settle the principles of the constitution. The declaration of rights adopted by the convention parliament was confirmed by the regular parliament, soon after; and the act of settlement, passed in 1700, contains 8 additional articles, further limiting the power of the crown, and protecting popular freedom. The most important of these articles is the 7th, by which judges were to hold their seats during good behavior, and their salaries were to be ascertained and established. The first mutiny bill was passed in 1689, and has been renewed annually ever since, giving to parliament control of the sword. A triennial bill was passed in 1694, but septennial parliaments were established in 1717. As the law originally stood, the king could keep the parliament chosen immediately after his accession to the throne during the whole of his reign. The triennial act repealed this prerogative, and the septennial act confirmed that repeal, while it extended the time for which parliaments might endure. No parliament, however, since that time, has existed for 7 years; and though the motives of the men who carried through the septennial act were unquestionably of a party character, neither they, as ministers, nor parliament, were guilty of usurpation, the right of parliament to pass such an act resting on the same ground as its right to adopt any law. The laws relating to treason, to libel, and to toleration, passed in the years immediately following the revolution, and which became part of the constitution, were generally of a liberal character. After the accession of the house of Hanover, an attempt was made by a portion of the whigs to close the house of peers. George I. gave his consent to the introduction of a bill by which, after a few more creations, no additions were to be made to the peerage. For

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the 16 elective peers of Scotland, 25 hereditary peers were to be substituted. Had this measure been successful, the worst consequences must have flowed from it. It did succeed in the house of peers, but the house of commons, under the lead of Walpole, threw it out. The government was strictly parliamentary down to the beginning of the reign of George III. That monarch attempted to rule parliament, and did not desist until he found that his best chance to accomplish his purpose would be through a union with that body. The demand for parliamentary reform commenced in the time of the American revolution, and was caused by the conviction that began to prevail among men of all classes that the existing abuses were owing to the vices of the electoral system. Had France remained quiet, the reform that was accomplished in 1832 would probably have been accomplished a generation earlier. The French revolution had the effect of delaying changes in England that were much demanded, as numerous members of the house of commons were returned by peers, or by rich individual commoners. The reform bill of 1832, though it changed the construction of the house of commons in some respects, did not lessen the power of that body, which is more influential now than it ever was before. The exclamation of Mr. Roebuck in 1858—"The crown! it is the house of commons!"—expresses in few words the precise character of the government of the British empire. The house of commons consists of 654 members, of whom 496 are returned from England and Wales, 105 from Ireland, and 53 from Scotland. The house of peers consists at present (1859) of about 450 members. Ireland sends 28 representative temporal peers, chosen for life, and 4 spiritual peers, who sit by rotation of sessions; and Scotland 16 representative peers, chosen for each parliament by the nobility of that country. The others are English temporal peers, with the exception of the 2 archbishops of York and Canterbury, and 24 bishops, who constitute the spiritual peerage of England. The house of peers is the supreme judicial court of the empire, exercising jurisdiction in civil causes upon appeals, and in criminal cases when brought before it by the house of commons by the process of impeachment. Peers can vote by proxy, but the privilege is not available when their house is in committee. Bills affecting the peerage must originate in the house of peers, and cannot be altered by the house of commons. When charged with treason or felony, a member of the upper house must be tried there; for lesser offences, by the common courts. The peer gives his verdict upon his honor, and answers in the same way to bills in chancery; but when a witness in any of the courts, he takes the usual oath. The sovereign, in theory, is almost as powerful as in early times, but in practice his power can hardly be said to exist. He can make war or peace, but the control of the purse and the sword by parliament neutralizes that prerogative. The money to pay the salaries of the officers he appoints must be voted by parliament. He cannot alter the standard of the money which it is his privilege to coin. The appointments he makes are virtually made by parliament, the ministers being only a committee of members of that body, selected from it by its consent, and responsible to it. He is held to be incapable of doing wrong, and the ministers are responsible for all that is done in his name, which, whatever its justice in former times, is proper now, the king being capable of doing nothing, while his "advisers" do every thing. He is head of the church, but he cannot alter the state religion, and should he become a Catholic he would forfeit his crown. The privy council is appointed by the king, and is bound to advise him to the best judgment of the members. With the advice of this body the king can publish proclamations, provided they are of a legal character. The council can inquire into all offences against government, and commit offenders for trial. The judicial committee of the council is a court of appeal in cases of lunacy and idiocy, and in admiralty and plantation causes, in questions between colonies, and all questions of a kindred character. It has an appellate jurisdiction over all parts of the empire, except Great Britain and Ireland, in the last resort. The executive government is in the hands of the ministry, which consists of the leading men of the dominant party. This has not always been the custom, for though there have always been ministers, a ministry was not formed till after the revolution, of which event it was one of the consequences. The cabinet, though now formed from the ministry, and often confounded with it, is not identical with it, and is indeed much older than the ministry. It originated in the custom, which was inevitable, of intrusting power to some few of the king's ministers. In the reign of Charles I. this knot of ministers, or "junto," as they were called, were in the habit of holding meetings in the cabinet of the queen consort, Henrietta Maria, whence the name came to have its present meaning. The word cabal had the same meaning for a time, but the unpopularity of the cabal ministry, in the reign of Charles II., caused it to become so odious that it has never since been employed in a respectful sense. The cabinet, or rather the cabinet council, has never been recognized by the law, it has no legal existence now, the names of the persons who compose it are never officially published, and no record of its doings is kept. The difference between the cabinet and the ministry may, perhaps, be best stated by mentioning the composition of the existing English government. The ministry now consists of 25 persons, but the cabinet has only 13 members, viz.: the first lord of the treasury, chancellor of the exchequer, lord chancellor, president of the council, lord privy seal, secretaries of state for the home department, for foreign affairs, for the colonies

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for war, for India, first lord of the admiralty, president of the board of trade, and president of the board of works. The secretaryship of India is of recent creation, dating only from 1858, when Victoria became queen of Hindostan, and the rule of the East India company over that country ceased. Among the ministers who are not of the cabinet are the commander of the forces, the postmaster-general, the lord lieutenant of Ireland, the chancellor of the duchy of Lancaster, the lord great chamberlain, the lord steward, and others. The post of prime minister, or premier, has generally been held by the first lord of the treasury since the accession of the house of Hanover. It was generally held by the lord treasurer in earlier times, but there has been no such officer since 1714. The office has ever since that date been in commission, and it was Sir Robert Walpole who first attached the place of prime minister to that of first lord commissioner of the treasury. Previously to that time a secretary of state had higher official rank than the head of the treasury; and after Walpole's fall, Lord Carteret (Earl Granville) was the principal man of the ministry to which he belonged, and was a secretary of state. It has sometimes happened that force of character has enabled a secretary of state to be premier in fact if not in name, as in the cases of the elder Pitt, Lord Castlereagh, and Mr. Canning; but the rule is, that the first lord of the treasury is premier. The two offices of first lord and chancellor of the exchequer have sometimes been held by the same person. The king can call a privy councillor to the cabinet, though he hold no office; and eminent men have sat in that body merely as cabinet councillors.—The principal authorities for the history of England are: the works of Turner, Palgrave, Kemble, and Lappenberg, on the Saxon times; Hallam's "Europe during the Middle Ages," and "Constitutional History of England;" Thierry's *Conquête de l'Angleterre par les Normands;* Miss Strickland's "Queens of England;" the works of Stephens, Creasy, and Raikes on the English constitution; the histories of England by Hume, Lingard, Knight, Macaulay, and Froude, the two last being devoted to special portions of that history.

ENGLAND, Church of, a Protestant episcopal organization established by law as the state church of England and Ireland. It is held by many that the gospel was preached in Britain in the 1st century by St. Paul himself during the period between his 1st and 2d imprisonments at Rome. It is at all events certain that the gospel was preached there, the church fully established, and the people generally, perhaps universally, converted to the faith, before the Saxon invasion. Of this early period in the history of the British church, however, we have much less information than could be desired. As early as 314, the island seems to have been divided into three ecclesiastical provinces, each with its metropolitan or archbishop, and of course with several bishops under each. These three metropolitan sees were York, London, and another, the name of which has been matter of dispute, although it is generally admitted that it was a Welsh province with its seat at a place called Caerleon upon the Uske, afterward at Menevia, now St. David's. At the council of Arles, in 314, the archbishops of these three sees were present as participants. There were also British bishops in the council of Sardica, in 347. About the middle of the 5th century the Saxons arrived in England, and in the course of the century following had not only gained the ascendency there, but had near the close of the century, in 596, to a very great extent exterminated Christianity also. Augustin came as a missionary from Gregory, bishop of Rome, to convert the Saxons to Christianity. Efforts were also soon after made both from Ireland and Scotland to reconvert England to the faith which had been lost. The Saxon domination, however, had not extended throughout the west of England in any such way as altogether to abolish the Christian worship. The facts of history also indicate that there must have been a large portion of the Christian population even within the heptarchy itself still remaining, more especially among the females. By all these influences combined the Saxons were soon converted, and a general union of the believers effected. With a view of establishing uniformity of doctrine and discipline in the British church, Augustin held several conferences with the Welsh bishops, 6 or 7 in number, but with little success, as the latter refused to acknowledge the supremacy of the bishop of Rome or to conform to the Roman custom of celebrating Easter on the first Sunday of the paschal full moon. The British Christians, like those of the East, kept the festival on the 3d day after the 14th of the Jewish month Nisan, whatever day of the week that might be. They resembled the orientals also in the practice of baptismal immersion. It is claimed that these facts show that the bishop of Rome, up to the year 596, had possessed no authority over the church in England, and that the English or rather the British church was under no disability, censure, or disadvantage in consequence of its independence of the see of Rome. However, the influence of the advocates of Roman supremacy prevailed, and in the course of a few generations secured a conformity of the English Christians to the doctrines and usages of Rome. The establishment of monastic houses, exempt from local ecclesiastical jurisdiction and subject only and directly to the pope, greatly increased the Roman influence, and the Norman conquest had a like effect, although the pope found it necessary to oppose and resist the conqueror, as the king was disposed to subjugate the church to the royal prerogative and use it for purposes of state policy much further than it suited either Alexander II. or his successor Gregory VII. (Hildebrand) to allow. The controversies and contests between the conquered Saxons and the conquering Normans continued till they were settled by the accession of Henry I. and Matilda of Scotland,

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and after that the quarrels between the king and his barons, ending in the resignation of his crown by John into the hands of the pope, to be received back by him and ever after to be held by an annual payment to the pope, served to increase the papal influence in England. From this period until the great reformation the ecclesiastical history of England, though marked by occasional disturbances and protests against the papal authority, has few features of general importance. But about the time when the preaching of Luther and his followers was arousing Germany, Henry VIII. undertook to set aside the pope's supremacy in England. Henry had married Catharine of Aragon, the widow of his deceased brother Arthur, but on falling in love with Anne Boleyn, he began to question the legality of his marriage. Anxious to prepare the way for a union with Anne, he requested the pope to declare his marriage with Catharine null *ab initio*, or to grant a divorce; but his request not being complied with, he referred the matter, by the advice of Thomas Cranmer, who now began to rise into notice, to his own clergy and universities, among whom, as well as at the seats of learning in foreign countries, he did not fail to find some who answered according to his wishes. Fortified by these opinions, Cranmer, who had been raised to the archbishopric of Canterbury, proclaimed the king's marriage with Catharine void, and confirmed his alliance with Anne Boleyn, whom he had privately wedded a few months before. The pope threatened Henry with the heaviest censures if he did not take back his legal wife, but Henry resolved to separate from the church of Rome rather than restrain his passion, and measures were at once taken to subject the clergy of the kingdom exclusively to the crown. A blow had already been struck at the old ecclesiastical system by the indictment of the English clergy in 1531 for supporting Wolsey in his powers as legate before receiving the royal sanction; and in the convocation held immediately after, in which a sum of money was voted to the crown by way of buying immunity from the consequences of conviction on this charge, the king was acknowledged to be "the one protector of the English church, its only and supreme lord, and, as far as might be by the law of Christ, its supreme head." By the same assemblage his marriage with Catharine was declared null, and in 1532 the parliament passed an act against paying to the pope the annates, or year's revenue of all bishoprics that fell vacant, which had formerly been paid to Rome as a tax on bulls issued to new prelates. At the same time it was ordained that no regard should be paid to censures which the pope might pass on account of this law, and that mass should be said and the sacraments administered as usual. In 1534 still more important measures were enacted. All payments made to the apostolic chamber, all bulls and dispensations were abolished; monasteries were subjected to royal government and visitation, and exempted from all other; the right to summon convocations, approve or reject canons, and hear appeals from the bishops, was vested in the king alone, and sentence of deposition was passed upon Campeggio and Ghinucci, bishops of Salisbury and Worcester. Though now honored with the title of supreme head of the church on earth, Henry contemplated no change in the doctrines of the old church, and no setting up of a rival community. Indeed, it was not until 30 years or more after these steps that the Roman Catholics and the reformers were looked upon as separate bodies, or had a separate ministry and separate places of worship. Throughout Henry's reign much less was done toward a change in creed or ritual than during the short reign of his son, Edward VI. The fundamental principle avowed from the first to the last, however, was that, beside retaining the ministry and the creeds of the primitive church, they must in all points of doctrine and discipline also accept its authority. In this view the offices of devotion were expurgated of what were deemed errors and innovations, and translated into English (having been previously used in the Latin language), and brought together as a "Book of Common Prayer and Administration of the Sacraments." Homilies were prepared to be read in all the churches for the instruction of the people; the Bible also was translated, and not only read in public worship by the clergy, but copies were placed at the public expense in the churches, where they were accessible at all times, except during the hours of public service; and, finally, articles of religion were agreed upon, now known as the "XXXIX. Articles," and were published as indicative of the extent to which the church of England had departed from the belief and usages that had prevailed in England before the reformation, and still prevailed in the churches that were obedient to Rome on the continent. On the death of Edward VI., Mary, daughter of Henry VIII. and Catharine of Aragon, Henry's first wife, ascended the throne. She was a devout adherent of the papal authority, and set herself to secure its recognition in England. To prepare the way for the realization of her object, an important change was made in the house of bishops. Some were declared to be no bishops, because they were married men; some were deprived of their sees because they had been appointed to them only during the good pleasure of the king. Five were condemned and burned at the stake for the part they had taken in the reformation. Thus under Mary's rule the state again became Catholic, but in about 5 years she died, and was succeeded by Elizabeth, the daughter of Henry and Anne Boleyn, who brought back the reformed faith and usages. The bishops who had been deprived by Mary, and had saved their lives by fleeing from the country, were brought back, and either restored to their own sees or promoted to others that were vacant. More than

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one-half the English bishoprics were either vacant when Elizabeth came to the throne, or presently became so without any act of hers. The filling of these sees gave her at once a majority in the councils of the church who sympathized with her, including among them of course those who had returned to occupy their old places. Several of Mary's bishops chose to retire rather than to conform. But in a short time things were restored in the English church to the condition in which they had been in the year previous to the death of Edward VI. During the latter part of the reign of Elizabeth, and throughout the reign of her successor, James, efforts were made to alter the articles of the church of England, so as to render them, if not unequivocally expressive of, yet entirely agreeable to, the Calvinistic theology. For this purpose the famous Lambeth articles were drawn up, and even the consent of Whitgift, archbishop of Canterbury, was obtained to their incorporation into the formularies and standards. The church, however, never gave any assent to those articles. And when, in 1628, King Charles issued his "Declaration concerning Religion," and required that the XXXIX. articles should be adhered to as the bond of union and standard of doctrine, he required that those articles should be received and held in their ordinary sense; "in the plain and full meaning thereof;" "in the literal and grammatical sense." The Calvinists complained bitterly that this was a restraint upon them, and a prohibition of their construction of the articles. We mention these facts to show that while the Roman Catholics had regarded the English church as being so far Protestant that they could not remain in its communion, the Calvinists also, whether those inclined to Presbyterianism or to Congregationalism, did not consider it possible to reconcile their theology with the XXXIX. articles in what was then understood to be their "accustomed, their plain and grammatical sense." After a season of trouble under the protectorate of Oliver and Richard Cromwell, from 1653 to 1660, the church was restored under Charles II. to its former position. The few bishops that remained, Juxon of London, Pierce of Bath and Wells, Skinner of Oxford, Warner of Rochester, Roberts of Bangor, Wren of Ely, Duppa of Salisbury, King of Chichester, and Frewen of Coventry and Lichfield, were restored, though not all to the sees they had held before, and the remaining sees again filled; the prayer book, lessons, and ritual came back into use as before the Puritan ascendency. Even during the protectorate, the church, though oppressed and persecuted, had continued her ministrations; such men as Sanderson, Hackett, Bull, Fell, &c., remaining at their posts, and in the performance of their duties. Although they were not allowed to use the common prayer book either in public ministrations or private devotions, some of them had committed its contents to memory, and used its formularies throughout. On the restoration of Charles II. a conference was held at the Savoy in London, to revise the "Book of Common Prayer and Administration of Sacraments," so as, if possible, to include all those who were inclined to dissent. Although the dissenters were represented by Baxter, the most learned, the mildest, and the most moderate of their number, no great result was accomplished. The dissenters, however, developed the fact that there was such a radical difference between the English church and themselves generally with regard to the fundamental conditions of salvation, regeneration, the means of grace, justification, &c., that no union could be effected between them, and no construction could fairly be put on the formularies of the church by which persons holding the views entertained by the dissenters, and denying the sacramental theory of the church, could consistently with honesty and self-respect remain in her communion. Charles II. was succeeded by his brother James II., a Roman Catholic. He sought first to secure for his own faith a free toleration in England, hoping, as it was supposed, to bring the English church again into conformity with that of Rome. The effort to do so was regarded as unconstitutional, and was one of the causes of the king's ejectment from the throne. A portion of the bishops and clergy who had been foremost to resist his efforts to Romanize the church, stood by him when the dissenters and others sought to place William of Orange on the throne in his stead. They considered themselves bound in conscience to preserve the purity and integrity of the church, and equally bound by their oath of allegiance to be faithful to his inherited right to the throne, and to that of his son James (Francis Edward). Hence they refused the oath of allegiance to William, and became known in history as the nonjurors. Beside adhering to the constitutional rights of James and his son, called the pretender, they were also the persons who were known as the high churchmen, in opposition to the low churchmen, who were so called because of the sympathy in their general views with the dissenters and non-churchmen. This state of things caused the high churchmen to be no favorites with William and his political advisers and friends; a feeling which has had its effect ever since. In 1717, during the reign of George I., the church, in consequence of its attempt to enforce its discipline upon Hoadley, bishop of Bangor, and a favorite with the king, was forbidden to hold sessions of its convocations, or to enter upon any legislative or ecclesiastical business of a corporate character. The convocation, however, continued to go through the form of an annual meeting, though it was invariably prorogued before it could proceed to business, and it is only within a very few years that its legitimate functions have been partially restored. It was undeniable that Hoadley had not only denied the divine origin and obligation of the episcopal polity of the church, but he had also denied other of the fundamental articles of the faith as taught and held by the English church,

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that for example with regard to the divinity of Christ. The effects of this ascendency of what has been called Erastianism in the church were soon felt. The high places in the church came to be sought by persons who had far more desire for the income and respectability of position which they afforded than for the work which they called for—more anxious in fact to benefit themselves by a good living than the souls of men by hard work and spiritual counsel and guidance. A general apathy in religious matters ensued—broken by such disturbances as the Wesleyan or Methodist movement, and the rise of the evangelicals of the school of Newton, Toplady, and Simeon, occasioned—until about 1830, when a movement was contemplated and actually proposed, which it was earnestly believed and seriously feared would sweep away all that was distinctive of the church as between itself and the Protestant dissenters. This fear and the prospect which it contemplated led to the publication of the "Oxford Tracts," by members of the university of Oxford, and that recurrence to the principles of the church as held and practised before the revolution of 1688, which has been characterized as "Puseyism;" principles which had for a time nearly died out with the non-jurors.—In the foregoing review of the history of the church of England we have aimed at the twofold purpose of (1) presenting an outline of its history, and (2) showing from this history both its ecclesiastical and its doctrinal position. Ecclesiastically, it claims to be the perpetuation and legitimate heir and representative of the church founded in England before the Saxon invasion, before the Norman conquest, before the reformation. The English claim that they had a perfect right to reject the papal authority, inasmuch as (1) it was not given by any direct divine institution or appointment witnessed or testified to in the Holy Scriptures; (2) its claims from the first were in contravention of the most sacred canons of the universal church; and (3) the discontinuance of any submission that there may have previously been to the see of Rome had at the time of the reformation become indispensable to the purity of religion, the best interests of the church, and the spiritual welfare of the people; so that if it were formally and in external appearance a schism (which they of course do not admit), it was nevertheless not only justifiable, but necessary. Doctrinally the church of England claims to be based on the Holy Scriptures, as interpreted in the Apostles' and other ancient creeds of the church that have been universally received, and to have kept herself aloof from all the modern systems of faith, whether of Calvin, or Luther, or Arminius, leaving her members free to enjoy their own opinions on all points not represented in the Scriptures as necessary to the soul's health, and refusing to be narrowed down to any other creed or creeds than those of the apostles and the primitive church. She claims also to have retained all that is essential to church organization in her episcopate, and in her liturgy to have not only a wise and judicious compend of doctrine and devotion, but also one of the most effectual of all possible conservative safeguards for the faith once delivered to the saints. The characteristic tenets of the church of England, beside the fundamental doctrines of the Trinity and redemption through the all-sufficient atonement once made for all by the death of Christ on the cross, are a regeneration or spiritual birth in baptism, in which the baptized becomes a member of the church, and a growth in grace by the use of the sacraments and ministrations of the church duly administered and duly received, made efficacious by the Word of divine truth and the gracious influences of the Holy Ghost, freely given to all who duly seek and faithfully use them. The condition of man after the fall is such that he can do nothing acceptable to God without preventing grace; good works, though pleasing to Heaven, have no power to put away sin; works of supererogation, over and above God's commandments, cannot be taught without arrogance and impiety; the church has power to decree rites or ceremonies, and to decide matters of faith; the Roman Catholic doctrines of purgatory, invocation of saints, and respect to relics and images, are rejected; clergymen are allowed to marry; and communion is to be given in both kinds. The number of sacraments is two, baptism and the Lord's supper. Three clerical orders are recognized, bishops, priests, and deacons, the first deriving their office in direct succession from the apostles by episcopal consecration, and the others receiving ordination at the hands of a bishop. Those of the second order are entitled archdeacons, deans, rectors, vicars, or curates, according to their functions. A reader is a layman licensed by the bishop to read in a church or chapel where there is no clergyman. Parson signifies a clergyman in possession of a parochial church.—The church of England is divided into 2 provinces, Canterbury and York, with an archbishop in each, and under these 26 bishops. The dioceses are much too large, and a gradual reduction in their size by divisions is being effected. Beside these are 32 bishops in the English colonial dependencies, with a number of clergy amounting in all, at home and in the colonies, to about 20,000. The dioceses of Ripon and Manchester, in the province of York, were created in the reigns of William IV. and Victoria; and the sees of Gloucester and Bristol, in the province of Canterbury, have been united. The bishop of Sodor and Man does not sit in parliament. The others constitute the spiritual peerage of England, and are in theory appointed by the crown, in fact by the ministry. Next to the archbishops rank the bishops of London, Durham, and Winchester, and the others take rank according to the date of their consecration. The revenues of the church of England are often represented as an endowment from the state—a tax levied and collected by parliament for the support of an institution for

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which many of the people have no choice or regard; but this is a mistake. At the time of the reformation nearly if not quite one-fifth of all the property in the realm, both real and personal, was in the possession of the church and ecclesiastical persons, and held by them for their own personal support, and for purposes of charity and religion. Much of this consisted in real estate which had been given in trust to the church, or to specific purposes in the church; much of it consisted in tithes which had been granted the church, and were thus an encumbrance on the property as it passed from the owner who granted those tithes to his heirs and posterity. Of the property then in possession of the church, a large part was taken into the royal exchequer, a large part was given to royal favorites, and enriched many a penniless family, thus placing them among the magnates of the land. The estates of the duke of Bedford are of this kind. But the present revenues of the English church are only what remain to it of the property which the church held under the old state of things; and the only agency of the state or the parliament in the matter may be stated in general terms to be merely the enforcement of the rights of property which originated as above described. It is indeed true that in consequence of the great changes in the value of property in so many years there is a great disparity in the incomes of the clergy. Other causes have also contributed to this result; and within a few years past a movement has been set on foot to remedy this defect. An ecclesiastical commission has been appointed, and some approach made toward converting the income of the church into a common fund, with a distribution to be made according to the wants and necessities of each office. The average income of the clergy, notwithstanding the large incomes of some of the sees, as Winchester, Canterbury, and London, is less than £400 per annum; and for about three-fourths of them its average is less than £100. In a few cases it is only £10; in others it reaches as high as £7,300. The total income of the church is about £5,500,000, and is derived from tithes, lands, church rates, pew rents, Easter offerings, and surplice fees. In 1851 the tithes were converted into rent charges, payable in money. From Queen Anne's bounty (so called because that sovereign granted the produce of first fruits and tenths, formerly sent to the pope, but from the reformation to her time paid to the monarch, "for the augmentation of the maintenance of the poor clergy") there is annually paid £14,000 to the holders of small livings; and similar disposition is made of other moneys from ecclesiastical sources. The number of places of worship of the established church in England, Wales, and the islands of the British seas, in 1851, was 15,131, having sittings for 5,619,946 persons.—In the United States the adherents to the doctrines of the Church of England are called Protestant Episcopalians. (See EPISCOPAL CHURCH IN THE UNITED STATES.)

ENGLAND, LANGUAGE and LITERATURE OF. The English is eminently a composite language, made up of contributions from other languages. It derives its origin from the Celtic, the Latin, the Anglo-Saxon, the Danish, the Norman French, and some others. For the investigation of this subject there are two modes. One of these is linguistic, and is more strictly philological. The affinities and diversities of the various words in the language furnish what may be called the internal evidence of the several sources from which the vocabulary and the constructions were derived. The other mode of research, which is ethnological, and which furnishes the external evidence from the history and migration of nations, often conducts to the same conclusions with the linguistic method. When, for instance, we hear of a stream called *Wans-beck-water*, and know that each of the 3 words of which the whole word is made up signifies "water," the first in the Celtic, the second in the German, and the third in the English, we recognize 3 changes of inhabitants, to whom the former name successively lost its significance. This is internal evidence. We also know from history that the Celts, the Saxons, and the English have successively occupied the territory where that stream is found. This is external evidence. Both kinds of evidence in this case conduct us toward the conclusion that the Celts and Saxons contributed materials to the formation of the language.—*The Celtic element.* In the English vocabulary are found basket, from the Celtic *basgowa;* cobble, from *ceubal;* mattock, from *matog;* pail, from *paeol;* and other words of a like derivation. Moreover, a large part of the names of the mountains, lakes, and rivers in the British isles are significant only in some Celtic dialect. The Celts were very early inhabitants of Britain. They emigrated from central Asia in the early ages of the world toward the west. They were probably pressed onward by other tribes, until they reached the Atlantic ocean and passed over the English channel into Great Britain. Their descendants are still found in Wales and in Cornwall, as well as in Ireland, in the highlands of Scotland, in the isle of Man, and in Brittany in France. Of Celtic words the English language has few; of Celtic constructions, none.—*The Latin element.* In the English vocabulary are found street, from the Latin *strata;* master, from *magister;* state, from *status;* April, from *Aprilis;* and many other words of a like derivation. The Romans under Julius Cæsar invaded England, 55 B. C., and afterward under Agricola completed the conquest of the country. Roman law and magistracies were everywhere established, and the Christian religion was introduced by those who spoke the Latin language. It should, however, be stated that the Latin words in the language were not, for the most part, introduced during the 500 years that the Romans had possession of Britain, but afterward, while Anglo-Saxons bore sway, or later still. A large number of Latin words were in-

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troduced by monks and learned men, relating to theology and science in general. Words of Latin origin constitute a very important part of the language, whether introduced directly from the Latin or through the Norman French. The following is the development of the Latin portion of the language: 1, stem verbs, or roots, as *bib*, *carp*, *cede*, *urge*; 2, stem adjectives, as *bland*, *brute*, *brev* (short); 3, stem substantives, as *arc*, *barb*; 4, primary derivatives, as *final*, *factor*; 5, secondary derivatives, as *valuable*, *moderate*; 6, derivative words with prefixes, as *abode*, *allude*; 7, compound words, such as *leopard*.—*The Anglo-Saxon element.* Whether we take into view the number or the sorts of words, the Anglo-Saxon is less an element than the mother tongue of the English. In the English language there are as many as 23,000 words of Anglo-Saxon origin. About ¼ of the words in actual use are from this source. The names of the greater part of the objects of nature, as *sun*, *moon*, *day*; all those words which express bodily action, as *to stand to stagger*; all those words which are expressive of the earliest and dearest connections, as *father*, *mother*, *brother*, *sister*, are Anglo-Saxon. Most of those objects about which the practical reason is employed in common life, nearly all English pronouns, a large proportion of the language of invective, humor, satire, and colloquial pleasantry, are Anglo-Saxon. English grammar is almost exclusively occupied with what is of Anglo-Saxon origin. The English genitive, the general mode of forming the plural of nouns, and the terminations by which we express the comparative and the superlative of adjectives (*er* and *est*), the inflections of the pronouns and of the verbs, and the most frequent termination of adverbs (*ly*), are all Anglo-Saxon; so are the auxiliary verbs. In fact, the Anglo-Saxon imparted so much of itself to the language, that the proximate origin of the English language is to be sought in Germany, and its remote origin is to be sought in central Asia, where was spoken the primitive tongue which may be regarded as the parent of the affiliated Indo-European languages, spoken by the successive tribes which migrated westward into Europe. The natural development of the Anglo-Saxon portion of our language has been nearly as follows: 1, instinctive forms and pronominal elements, as *ah*, *oh*; 2, stem words or roots, as *bend*, *swim*; 3, stem nouns, as *blank*, *band*; 4, reduplicate forms, as *chit-chat*, *sing-song*; 5, primary derivatives, as *chatter*, *toilsome*; 6, secondary derivatives, as *carefully*, *tiresomeness*; 7, words with prefixes, as *arise*, *forbid*; 8, compound words, as *god-man*, *pick-purse*; 9, disguised compounds and derivatives, as *daisy*, *not*.—*The Danish element.* Many hundreds of words in the language, especially those used as the names of places, are Danish, introduced during the incursions and occupation of England by the Danes. A portion of these words are indeed provincial, being confined to the northern and north-eastern counties of England, the regions most exposed to Danish visitation.—*The Anglo-Norman element.* An etymological analysis of the language shows that the Anglo-Norman element enters very largely into its composition. This element, which is composed of the Celtic, the Latin, and the Scandinavian, was first introduced (1066) by the Normans, under William the Conqueror. Norman French was spoken by the superior classes of society in England from the conquest to the time of Edward III. (1327). The laws of the realm, the proceedings in parliament and in courts of justice, were in that language. In the 13th century, during the progressive mixture of the two races, a literature sprang up in which the two languages were more or less mixed together. In the 14th century the Anglo-Saxon principle seemed to have gained the upper hand. In the 15th century the Anglo-Norman element seemed to be gaining the preponderance; but the proportions still continued to vary until it became fixed in the age of Queen Elizabeth. Words were generally adopted into the common language from the Anglo-Norman or the Anglo-Saxon, according as the objects or ideas expressed by those words belonged more exclusively to one race or the other. Thus the names of common articles of dress are Anglo-Saxon, as *shirt*, *breeches*, *hose*, *shoes*, *hat*, *cloak*; but other articles subject to changes of fashion are Anglo-Norman, as *gown*, *coat*, *boots*, *mantle*, *cap*, *bonnet*. The word *house*, a common residence, is Anglo-Saxon; but *palaces*, *castles*, *manors*, and *mansions* are Anglo-Norman. The names *ox*, *colt*, *sheep*, *pig*, *boar*, are Anglo-Saxon, because that part of the population were engaged in tending those animals while they were living; but *beef*, *veal*, *mutton*, *pork*, *venison*, are Anglo-Norman names, because that part of the population were accustomed to eat their flesh when they were killed. The natural development of the Anglo-Norman or Romanic portion of the language is nearly as follows: 1, verbal roots in English, as *boil*, *cay* in decay, *ceive* in conceive, *pound*, *vouch*; 2, stem adjectives, as *chaste*, *clear*; 3, stem substantives, as *beast*, &c.; 4, derivative words with suffixes, as *flourish*, *authorize*, *volunteer*, *arabesque*, *plumage*, *journal*, *service*, *fashion*; 5, derivative words with prefixes, as *avouch*, *antechamber*, *countermark*; 6, Romanic compounds, as *portfolio*, *wardrobe*; 7, disguised Romanic words, as *biscuit*, *bachelor*, *proctor*, *curfew*. The common statement is, that Anglo-Saxon was converted into English: 1, by contracting and otherwise modifying the pronunciation and orthography of words; 2, by omitting many inflections, especially of the noun, and consequently making more use of articles and auxiliaries; 3, by the introduction of French derivatives; 4, by using less inversion and ellipsis, especially in poetry.—Beside the languages already mentioned which have contributed to the composition of the English, several others, and especially the Greek, should also be mentioned: 1, Greek verbal roots, as *arch*, in archetype, *graph*, in graphic; 2, Greek

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stem adjectives, as *kal*, beautiful, in calligraphy, *kryph*, "hidden," in apocrypha; 3, Greek stem substantives, as *rhomb*, *chord;* 4, Greek derivative words with suffixes, as *poet*, *chrism;* 5, secondary derivatives, as *Baptist*, *Christian;* 6, Greek derivative words with prefixes, as *apoplexy*, *catarrh*, *catastrophe;* 7, Greek compounds, as *democracy*, *pedagogue*. There are also in the language Hebrew words, as *manna*, a gum, *jasper*, a precious stone, *sabbath;* Spanish words, *cortes*, *don;* Italian words, as *stanza*, *piazza;* Russian words, as *czar*, *ukase;* Persian words, as *bazaar*, *shah;* Arabic words, as *alembic*, *gazelle;* Chinese words, as *chop*, *hyson;* and Indian words, as *hominy*, *moccason*. "We Britons," says Harris, "in our time, have been remarkable borrowers, as our multiform language may sufficiently show. Our terms in polite literature prove this, that they come from Greece; our terms in music and painting, that these come from Italy; our phrases in cookery and war, that we learned these from the French; and our phrases in navigation, that we were taught by the Flemings and Low Dutch."—From its composite character, the English is naturally copious in its vocabulary and phrases. There are large classes of words derived from the Norman or the classical languages which are, in common parlance, synonymous with words derived from the Anglo-Saxon, so that a writer may have his choice whether to use the Romanic or the Teutonic element, a choice of great value to him who has the taste to preserve the delicate differences of words as well as their agreement. General terms are derived from the Latin; those that denote the special varieties of objects, qualities, and modes of action, are derived from the Anglo-Saxon. Thus, *color*, a general term, is Latin; but *white*, *black*, *green*, particular terms, are Anglo-Saxon. It has been correctly remarked that "Latin furnishes the elegant, the Saxon the common expression, as *bad odor* and *stench*, or *perspiration* and *sweat*." In looking through the several stages of the language, namely, the Saxon, the semi-Saxon, the old English, the middle English, the modern English, we are struck with the constant death of old words, and the constant birth of new ones that come in to fill their places. In the early periods this was due to the successive irruptions of foreigners, who in introducing their own language necessarily expelled a portion of the vernacular whose place it took. "Great verity," says Camden, "was the glory of the English tongue before the Norman conquest, in this, that the old English could express most aptly all the conceits of the mind in their own tongue without borrowing from any." "The alteration in our tongue hath been brought about by the entrance of strangers, as Danes, Normans, and others who have swarmed hither; by traffic, for new words as well as new works have always come in; by the tyrant Time, which altereth all things under heaven; by use, which swayeth most and hath an absolute command in words." Another cause of the mutations we have referred to is that the pursuits of the English people have been multiform beyond those of any European nation, and the language has correspondingly changed. Lexicographers too, in their zeal to introduce new words, to the neglect of old ones, have contributed to the changes by recording the one class and by omitting the other. In Halliwell's "Dictionary of Archaic and Provincial Words" there are more than 50,000 words not recorded in modern dictionaries.—For further information on this subject the reader may consult Grimm's *Deutsche Grammatik* (4 vols., Göttingen, 1819–'37); Guest's "History of English Rhythms" (London, 1838); Rask's "Anglo-Saxon Grammar," translated by Thorpe (London); Bopp's "Comparative Grammar," translated by Eastwick (3 vols. 8vo., London); Trench's "English, Past and Present" (New York ed., 1855); Goold Brown's "Grammar of English Grammars" (New York, 1857); Latham's "Hand-Book of the English Language" (New York ed., 1857); Fowler's "English Language in its Elements and Forms" (New York, 1859).—ENGLISH LITERATURE was preceded in the British islands by compositions in the Cymric or ancient British, Anglo-Saxon, Anglo-Norman or early French, and Latin languages. There are extant a few Cymric metrical pieces which date probably from the 6th century; they are the songs of the celebrated Welsh bards Aneurin, Taliessin, Llywarch-Hen, and Merdhin, the sage as well as poet, whom succeeding centuries transfigured into the enchanter Merlin. To Gildas, a brother of Aneurin, is attributed a Latin prose tract, *De Excidio et Conquestu Britanniæ*, which, if genuine, is the earliest historical work produced in Britain that has been preserved. The personages mentioned in these eldest British songs and annals, as Arthur, Merlin, Kay, and Gawain, played prominent parts in romantic literature a few centuries later, and even to this day afford favorite themes for the poets. During the Anglo-Saxon period both a vernacular and a Latin literature were cultivated, their most flourishing era being the 8th century, the age of Alcuin, Aldhelm, Bede, and Ceolfrid. The monasteries of England and Ireland sent forth many scholars of European celebrity for learning, and Alcuin and Erigena served especially to associate these countries with the continent in liberal studies. The alliterative, unrhyming versification of the Anglo-Saxons continued to be employed in some of the early English poems. The Norman conquest, however, almost abolished the use of the Anglo-Saxon language in writing, and for more than a century the prevalent literature of England was either in Latin or in Anglo-Norman. Lanfranc and Anselm, who were attracted from France by the conqueror, and became successively archbishops of Canterbury, originated or revived the scholastic philosophy, the treatises on which were in Latin, and several of the most eminent later doctors of which, as Alexander Hales, Duns Scotus, and William

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Occam, were of British birth. Roger Bacon is especially remarkable for his acquaintance with Hebrew and Arabic literature, and quotes from 10 of the most highly reputed Saracen authors. In connection with him may be mentioned Michael Scotus, the wizard of the northern ballads, whose writings were celebrated throughout Europe. The scholastic writers of the 12th century prided themselves on their epistolary style, and many collections of their letters have been preserved, which are among the most valuable illustrations of the public and private history of the time. These letters begin with Lanfranc, were very numerous in the reign of Henry II., and the most interesting of them in a literary point of view are those of John of Salisbury and Peter of Blois. Latin poems abounded throughout the 12th century, and those of Laurence of Durham, John of Salisbury, John de Hauteville, Nigellus Wirker, and Alexander Neckham, contain passages of nearly classic elegance. The most ambitious attempts were by Joseph of Exeter, who wrote two epics in heroic measure. A new style of versification, in which rhymes took the place of the ancient metres, was introduced, and soon attained an attractive energy and sprightliness. It was brought to perfection in the satirical poems attributed to Walter Mapes, which exhibit excellent sense and humor amid bacchanalian jovialities. In his *Confessio Goliæ* is found the famous drinking song beginning *Meum est propositum in taberna mori*. This kind of poetry became extremely popular, and flourished long after the style of the more serious Latin authors had become hopelessly debased. But the most important Latin works during the Norman period were the chronicles or histories, all of them by ecclesiastics. The chronicle of Odericus Vitalis (died in 1132) was the first in which history was made an object of laborious research; that of William of Malmesbury is the most elegant; and that of Geoffrey of Monmouth exerted the greatest influence on subsequent literature, becoming one of the cornerstones of romantic fiction. It narrated Welsh and Armorican traditions of British history from Brutus, an imaginary son of Æneas, to Cadwallader in the 7th century. Ingulphus, Henry of Huntingdon, Giraldus Cambrensis, Roger de Hoveden, Matthew Paris, and Jocelin de Brakelonde, are perhaps the other most important names in the long catalogue of monkish chroniclers. The earliest Anglo-Norman compositions extant are supposed to belong to the first part of the 12th century. In the reigns of Stephen and Henry II. a school of poets was formed devoted to versifying history in that language, the three great masters of which were Wace, Gaimar, and Benoit de Sainte-Maur. Wace translated Geoffrey's British history into Anglo-Norman verse, under the title of the *Roman de Brut*, which extends to over 15,000 lines; and also wrote the *Roman de Rou*, giving the legends concerning Rollo the Norman. Gaimar made a metrical continuation of the narrative of Geoffrey to the Norman period; and Benoit composed a romance of the history of Troy, which upheld the claims of several of the western nations to a Trojan origin. The cycle of romances relating to Arthur and the round table were prevalent in England from the 11th to the 14th century. They were in the French language, but several of them, as the "Merlin," "Lancelot," "Queste du Saint Graal," and "Mort d'Arthure," were written by Englishmen for the English court and nobles. Some writers have maintained also that the lays of Marie and the romances concerning Charlemagne and his paladins appeared in England earlier than in France. The original source of these fictions, and of romantic poetry in Europe, is attributed by Bishop Percy to the Scandinavians through the Normans, by Warton to the Arabians through the Moors of Spain, and by Ellis and Turner to the inhabitants of Armorica or Brittany.—During this prevalence of Latin and Anglo-Norman literature the Anglo-Saxon language had been confined to the conquered race, but the Saxon chronicles had been carried on in obscure monasteries by various annalists to the year 1154. About 50 years later, when the two races began to unite in one nation, a work appeared written in Anglo-Saxon so much modified by French that it is usually accounted the beginning of English literature. This was Layamon's translation of Wace's *Roman de Brut*, which was followed in the 13th century by a multitude of translations from Latin and Anglo-Norman. The older chronicles were more or less closely followed in the English metrical pieces of Robert of Gloucester and Robert Manning, a monk of Bourne. The Anglo-Norman romances were reproduced in the English metrical romances of "Sir Tristrem," "Sir Perceval of Galles," "Ywaine and Gawayne," "Havelok the Dane," "King Horn," "Cœur de Lion," "King Alesaunder," "Morte Arthure," "Sir Guy," the "King of Tars," and many others. "Sir Tristrem," which is one of the oldest of them, was attributed by Sir Walter Scott, on grounds now generally admitted to be unsatisfactory, to the Scottish poet Thomas the Rhymer. The body of Latin tales entitled *Gesta Romanorum*, perhaps of German origin, was now and continued much later to be a source of materials for English authors. The first original English poet, who left the beaten track of translation from chronicles, romances, and legends of the saints, was Laurence Minot (about 1350), the author of some short ballad-like poems on the victories of the English armies in the reign of Edward III. Richard Rolle, a hermit of Hampole, produced about the same time a moral poem entitled the "Pricke of Conscience." The most remarkable production before the age of Chaucer is the "Vision of Piers Ploughman," ascribed to Robert Langlande. It is in alliterative verse, without rhyme, abounds in allegorical personifications, and is a satire on the vices of the times and especially of the ecclesiastics. It has passages of humor and extraor-

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dinary poetical vigor, but the author seems to have preferred an obsolete and unrefined diction. Its popularity caused many imitations to be made of it, the best of which was "Piers Ploughman's Crede," written by a Wycliffite. Contemporary with Chaucer was Gower (1325–1408), whose *Confessio Amantis*, in octo-syllabic metre, is a miscellaneous collection of stories and of physical and metaphysical reflections. Chaucer calls him the "moral Gower," and his poetry is of a grave and sententious turn, professedly serious and instructive. Both in genius and style he is much inferior to Chaucer (died about 1400), the first great English author, admirable for the comprehensiveness and variety of his powers and for an inborn kindly joyousness, which make him comparable with Shakespeare. A courtier and traveller, he was one of the earliest English writers who was not an ecclesiastic, and he excels especially in merry narrative and in portraiture of character. He introduced and employed with facility the regular iambic couplet, the most approved English metre. The prologue to the "Canterbury Tales" is perhaps unsurpassed as a description of character and manners, and the "Knight's Tale" is among the noblest of chivalrous romances. Chaucer has been often compared to the appearance of a genial day in spring, preceded and followed by dark clouds and wintry blasts; and from his age to that of Spenser the history of English poetry is but a barren theme. There is a desolate period of more than 100 years, an age of disputed successions and civil wars, when, says an old historian, "the bells in the church steeples were not heard for the sound of drums and trumpets." Till the accession of Elizabeth, the best of numerous versifiers are John the Chaplain, Occleve, the versatile Lydgate, Hawes, Skelton the laureate, who has been likened to Rabelais, his rival Barclay, the earl of Surrey, Sir Thomas Wyatt, George Gascoyne, Thomas Tusser, and Thomas Sackville, afterward Lord Buckhurst. Of this series, Surrey (1516-'47) is most esteemed as an improver of English verse. He is said to have made the tour of Europe in the spirit of chivalry, proclaiming the unparalleled charms of his mistress Geraldine, and returned to England distinguished as the most devoted lover, learned nobleman, and accomplished gentleman of his age. In his verses he copied the simplicity and grace of the Italian poets, avoiding learned allusions or elaborate conceits, and naturalized the sonnet in England. He also gives the earliest example of blank verse. Wyatt coöperated with him in seeking the elegances of composition; but he embarrassed his songs and sonnets with witty and fanciful conceits. John Heywood is remembered only for his interludes, but he wrote also 600 epigrams, and his most labored performance is the "Spider and the Flie," pronounced by Warton to be the most tedious and trifling of apologues, "without fancy, meaning, or moral." The most remarkable poem between Surrey and Spenser is the "Mirrour for Magistrates," written by a combination of authors, the chief of whom was Sackville. He furnished alone its most valuable portion, the "Induction" or prologue, an imitation of Dante, marked by a monotony of gloom and sorrow, but comparable with the finest passages of Spenser for grandeur of imagination and power of language. The ballad literature of England and Scotland is of uncertain date, but much of it, as "Chevy Chase," the "Nobrowne Mayde," and the numerous ballads about Robin Hood, probably arose in the 15th and 16th centuries. Its golden era was the time of Mary, queen of Scots. During this period Scotland had a succession of genuine poets, Barbour (died in 1396), who wrote an epic entitled the "Bruce," having been followed by Wyntoun, Blind Harry, Gawin Douglas, and William Dunbar.—English prose begins with Sir John Mandeville's narrative of his travels, written in Latin, French, and English, soon after his return to England in 1355. It is a medley of his own observations, with ancient fables and the marvels reported by other travellers. Nothing like the excellence of later English prose was produced for a century and a half more, during which time Trevisa translated Higden's Latin *Polychronicon*, Wycliffe began to show the copiousness and energy of the language in his translation of the Bible, Chaucer composed two of the Canterbury tales and two other works in prose, Bishop Peacock wrote in favor of reason rather than constraint as a means of bringing the Lollards within the pale of the Catholic church, Tiptoft translated Cicero's *De Amicitia*, Lord Rivers became an author by his "Dicts of Philosophers," and Sir John Fortescue (died in 1470) surpassed all of his predecessors in the style of his treatise on the "Difference between an Absolute and a Limited Monarchy." The first book printed in England is supposed to have been the "Game of Chess," by Caxton, in 1474. As an author, by translating from the French, and often by continuing the works which he printed, Caxton probably exerted a greater influence on prose literature than any other individual between Chaucer and the reign of Henry VIII. Chroniclers nearly contemporary with him were Robert Fabyan and Edward Hall. A curious collection of letters has been preserved, written by members of the Paston family in the reigns of Henry VI., Edward IV., and Henry VII., which forms the oldest body of private letters in any modern European language. To the reign of Henry VIII. belongs Sir Thomas More's "History of Edward V.," the first example of a pure and perspicuous prose style, marked by a diminution of obsolete phraseology, and a certain modern turn and structure, and conveying also just and striking thought. His *Utopia*, in which he developed his theory of a perfect society, was first published in Latin, and was scarcely excelled in spirit and originality by any previous Latin work written in Europe since the revival of letters. Prior to Elizabeth, or early in her reign, were written also the "New Year's Gift" and the "Itinerary" of Leland, the "Gouvernour" of Sir Thomas Elyot, the "Art of Rhet-

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orique" of Thomas Wilson, the biography of Wolsey by Cavendish (first printed in 1641), the translations of the Bible by Tyndale and Coverdale, the sermons and letters of Latimer, and the "Toxophilus" of Roger Ascham, who was the first accomplished scholar that composed his chief works in English.—The annals of the British drama begin with miracle plays, which are first mentioned as being represented in London in the latter part of the 12th century. They were on sacred subjects, usually from the Old and New Testaments, were written, and to a comparatively late period acted, by ecclesiastics, and were at first performed in churches and the chapels of monasteries. They were performed on holy days in the largest towns, the most famous and frequented being those of Chester, Widkirk, and Coventry. At Chester they continued every Whit-Sunday, with some interruptions, from 1268 to 1577, and were in Latin or French till in 1338 Higden "obtained leave of the pope to have them in the English tongue." The most ancient extant miracle play in English is at least as old as the reign of Edward III. It is founded on the 16th chapter of the apocryphal gospel of Nicodemus, is entitled the "Harrowing of Hell," and consists of a prologue, epilogue, and intermediate dialogue between 9 persons, among whom are Dominus, Satan, Adam, and Eve. Beside this and a few other single pieces, there exist 3 distinct sets of them: the Townley collection, 30 in number, supposed to have belonged to Widkirk abbey, before the suppression of the monasteries; the Coventry collection, performed in that city on the feast of Corpus Christi, 42 in number; and the Chester Whitsun collection, 30 in number. Miracle plays were transformed into moral plays by exchanging scriptural and historical characters for abstract, allegorical, or symbolical impersonations. This sort of religious drama was in a state of considerable advancement in the reign of Henry VI., and reached its highest perfection in that of Henry VII. Two prominent personages in them were the Devil, and a witty, mischievous, profligate character, denominated the Vice. "By the relinquishment of abstract for individual character," says Mr. Collier, "they paved the way, by a natural and easy gradation, for tragedy and comedy, the representations of real life and manners." John Heywood, the epigrammatist, who belonged to the court of Henry VIII., contributed to driving biblical and allegorical personages from the stage, and his plays form a class almost by themselves, termed interludes. The later plays of Bishop Bale also belong to the period of transition, and he was the first to apply the name tragedy and comedy to English dramatic representations. The earliest comedy is the "Ralph Roister Doister" of Nicholas Udall, and is at least as ancient as the reign of Edward VI. It has 13 characters, 9 male and 4 female, represents the manners of polished society, and could not be performed in less than 2½ hours. It is superior to "Gammer Gurton's Needle," by John Still, the second in point of time, which was acted at Cambridge university in 1566, and contains the first drinking song of any merit in the language. The earliest extant piece that can be called a tragedy is the "Ferrex and Porrex" of Thomas Sackville and Thomas Norton, afterward named the "Tragedy of Gordobuc," which is in regular blank verse, consists of 5 acts, and was acted before Queen Elizabeth at Whitehall in 1561. During a part of the reign of Elizabeth miracle plays, moral plays, and romantic dramas were prevalent together. The custom of acting Latin plays in the universities of Oxford and Cambridge continued till Cromwell's time.—From the middle of the reign of Elizabeth to the accession of Anne (1580–1702), and more particularly to the great rebellion (1580–1642), may be reckoned the period of the so-called old English authors. The more limited era is unsurpassed in force, variety, and originality of literary genius in the annals of the world. Among the influences which excited vast intellectual and moral activity were the study of the classics and of the literatures of Italy and France, the discovery of America and of the right theory of the solar system, the reformation, the practical results then following from the invention of gunpowder and of printing, and from the overthrow of feudalism, the assertion of individual rights, and the enthusiastic sense of national independence and power. New ideas and interests aroused the minds of men, and the old forms and institutions, disappearing from actual life, lingered in the imagination and were idealized in poetry. The language rapidly grew to a strength and affluence which Dr. Johnson declared adequate to every purpose of use and elegance, while a masculine vigor, sometimes coarse, sometimes highly delicate, marked all the diversities of character and culture. The most extensive and important department of literature during this epoch was the drama, which distinguishes that age from all preceding and less decisively from all subsequent periods. It had two distinct periods, that of the old English dramatists (in the narrowest use of the term) prior to the civil war, and that of the comic dramatists after the restoration. In the former series the most eminent names are Marlowe, Shakespeare, Ben Jonson, Beaumont and Fletcher, Chapman, Decker, Webster, Marston, Massinger, Ford, Thomas Heywood, and Shirley. Among the precursors of Shakespeare were also John Lilly, whose 9 plays, and especially "Endimion," have always had a few admirers for their dainty and conceited style; Thomas Kyd, whose "Spanish Tragedy," improved by Jonson, is said to have gone through more editions than any other play of the time; Thomas Nash, a ribald satirist; Robert Greene, whose comedies are lively, fantastic, and in a florid style, and whose "Friar Bacon and Friar Bungay" is one of the latest plays in which the devil appears in person; George Peele, whose "David and Bethsabe" has been termed the

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earliest fountain of pathos and harmony in English dramatic poetry; and Thomas Lodge, who was associated with Greene in writing the "Looking-Glass for London and England," a strange performance, in which the prophecy of Jonah against Nineveh is applied to the city of London. All of these abound in bombast and pedantic classical allusions. A more potent spirit was Christopher Marlowe (1565–'93), who, throwing off the shackles of rhyme, gave to blank verse an easy modulation and rhythm, and produced scenes and passages of wonderful beauty and grandeur amid rant and buffooneries. His most admired plays are the "Jew of Malta," "Edward II.," and the "Life and Death of Dr. Faustus," and the last best illustrates the "fine madness" of his character. An awful melancholy pervades the fiend Mephistopheles, more impressive than the malignant mirth ascribed to him by Goethe. Marlowe was the immediate precursor of William Shakespeare (1564–1616), the greatest name in English literature, whom a poet has styled "the genius of the British isles," and who stands at the head of the romantic or Christian drama. A comparison of his works with those of his contemporaries proves his superiority as much in judgment and taste as in creative power, for a large proportion of his plays are more regular than any other prior to the close of the civil wars. The rules of the classical dramatic art were not then in vogue; the French neoclassical drama had not been originated; and though Shakespeare violated the ancient unities of time and place, he observed almost universally the unity of feeling and of interest, which is perhaps the only unity possible in any drama that embraces the wide scope, the fine materials, and the passionate intensity of Christian thought. The soundest criticism has vindicated for him the character of a profound artist as well as a great and luxuriant genius, and his peculiar excellences appear in the marvellous variety and verisimilitude of his personages, in the skill with which opposite characters are grouped and the finest and most diversified threads woven into a harmonious web, and in the completeness with which the entire action as well as the several characters is worked out, minute features and particulars being poetically conceived with reference to the universal system of things. Shakespeare's plays are 34 in number (the authorship of some of which, however, is disputed), and are usually divided into tragedies, comedies, and histories. Since the beginning of the present century their supremacy has attained unqualified and intelligent recognition. A friend of Shakespeare and his associate in the Mermaid, the oldest of clubs, was Ben Jonson (1574–1637), one of the most familiar of the names of the old dramatists. He had scholarly acquaintance with the classics, and labored to make the laws of the ancients authoritative in English dramatic art. He is the author of two tragedies, "Catiline" and "Sejanus," and of numerous comedies and masques, the best of which are the "Alchemist," "Volpone, or the Fox," and the "Silent Woman." They are full of solid materials, in a stately, eloquent, but often intolerably pedantic style, and seem to have been produced slowly and upon deliberation, the wit, fancy, and satire being severely elaborated. Dryden admired him as the pattern of elaborate writing. His poetical character appears in its most pleasing aspect in the lyrical verses with which his masques are varied and enlivened, especially in the pastoral drama of the "Sad Shepherd," which display an admirable taste and feeling, and have all the charms of song. Jonson may have aimed at an audience of men of sense and knowledge, but Beaumont and Fletcher wrote for men of fashion and the world. Of the 52 plays published under their joint names, Beaumont may have had a part in only 17. They are keen, vivacious, and often elegant, but slight and superficial in comparison with Shakespeare's and Jonson's; the songs scattered through them are, however, among the most subtly beautiful in the language. The dramas of George Chapman (1557–1634), the translator of Homer, contain "more thinking" than those of most of his contemporaries; they have many passages of striking grandeur, are in a lofty and extravagant style, and their contemplations on the nature of man and the world leave impressions favorable to moral excellence. The "Fortunatus" and "Honest Whore" of Thomas Decker have graceful and genial passages, and the "Duchess of Malfy" and "White Devil" of John Webster are full of horrors cleverly managed, and have been esteemed among the most striking tragic productions of this period. The modern reputation of Thomas Middleton rests chiefly on his "Witch," which may have suggested to Shakespeare the supernatural scenery in "Macbeth;" and the coarse plays of John Marston abound in murders, ghosts, and scornful satire. Of the tragedies of Philip Massinger (1584–1640), the "Duke of Milan" and the "Fatal Dowry" are among the best; and of his comedies, the "Picture," the "Bondman," and "A Very Woman." His "New Way to Pay Old Debts" still keeps the stage, for which it is indebted to its effective character of Sir Giles Overreach. His style has an easy and majestic flow, and "he is read," says Lamb, "with composure and placid delight." John Ford (1586–1639) preferred dark vices and the deepest distress for subjects, and his works make a sad and abiding impression, having, as Hallam remarks, the power over tears. He seems to have taken an intellectual pleasure in revolving the various possibilities and revenges of sin, and the best of his plays bears the title of the "Broken Heart." Thomas Heywood, an indefatigable and popular dramatist, wrote "beautiful prose put into heroic metre." James Shirley (died in 1667) is the last of this circle of dramatists, and the least remarkable either for merits or faults. Under the commonwealth, and the ascendency of the Puritans, who had always been at feud with the wits, the theatres were closed, and the players flogged.

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At the restoration, the drama was revived under the influence of French rules, and of a strong anti-Puritan reaction, and the larger part of the plays for 40 years are declared by Macaulay to be a disgrace to the English language and the national character. A shamelessness, as inelegant as it was immoral, was the common characteristic of the drama. To ridicule and degrade virtue, sincerity, and prudence, was the business of the stage, which it followed with an impudence so unblushing as to have the charm of diabolical *naïveté*. Blank verse was for a time displaced by rhyme, but the tragic authors soon returned to the former, and the comic sank to familiar prose. The best tragedies of the period are the "Orphan" and "Venice Preserved" of Thomas Otway (1651–'85); and though the former displeases the delicacy of our age, the latter has been more frequently represented than any other tragedy after those of Shakespeare. The genius of the unhappy poet appears especially in pathetic delineations of passion and misery, and few heroines have been so highly honored with the tribute of tears as Belvidera in "Venice Preserved." John Dryden, who was rivalled by none of his contemporaries as a satirical, didactic, and lyric poet, abused his rare gifts to attain dramatic success, the faculty for which nature had denied him. His "Don Sebastian," "Spanish Friar," and "All for Love," are the best of numerous tragedies and comedies, the absurd bombast and ribaldry of which have made them almost forgotten notwithstanding their surprising incidents, stately declamation, and harmonious numbers. The "Fatal Discovery" of Thomas Southerne, the "Jane Shore" of Nicholas Rowe, the "Fatal Curiosity" of William Lillo, the "Mourning Bride" of Congreve, and the "Rival Queen" of Nathaniel Lee, may also be mentioned among successful tragedies. The proper representatives of the comedy of this period are William Wycherly, William Congreve, George Farquhar, and Sir John Vanbrugh, and among their profligate plays the most popular were the "Plain Dealer" and the "Country Wife," "Love for Love" and the "Way of the World," the "Beaux Stratagem" and the "Trip to the Jubilee," and the "Provoked Husband" and the "Provoked Wife." Mrs. Aphra Behn, Thomas Shadwell, and Sir George Etherege also deserve mention among those who made the stage as immoral as their talents permitted. The "Careless Husband" and other plays of Colley Cibber, and the "Busy Body" and "Bold Stroke for a Wife" of Mrs. Centlivre, connect the period of the restoration with that of Anne. Among the non-dramatic poets of the period from Elizabeth to Anne, Edmund Spenser (1553–'99), John Milton (1608–1674), and John Dryden (1631–1700), successively held preëminence. The unfinished product of Spenser's imagination, the "Faëry Queen," is a monument of the contemplative and retrospective thought of the Elizabethan age, an age as philosophical as it was adventurous. The moral allegory, which had been among the earliest fruits of modern literature, was brought to perfection in this poem, which presents exquisitely beautiful pictures of an ideal chivalry in a land of enchantment. Yet the descriptions of an imaginary world, though luxuriant and circumstantial, often lack the interest of real life, and affect us as remote and abstract speculations. Its peculiar stanza, to which his name has been given, a modification of the Italian *ottava rima*, with the addition of an Alexandrine to each verse to give a full and sweeping close, was an innovation in the art of poetry, and has since been adopted by Shenstone in his "Schoolmistress," Beattie in his "Minstrel," Byron in his "Childe Harold," Thomson in his "Castle of Indolence," Shelley in his "Revolt of Islam," and by many other English poets. The "Shepherd's Kalendar," and the hymns to "Love" and "Beauty," are among the finest of Spenser's minor pieces, the last revealing his sympathy with Platonic doctrines. Nearly contemporary with the "Faëry Queen" were the songs and sonnets of Sir Philip Sidney; the "Saint Peter's Complaint" and "Mary Magdalene's Funeral Tears" of Robert Southwell; the "Civil Wars," "Complaint of Rosamond," and numerous minor pieces of Samuel Daniel, of a pensive character, and in remarkably pure style; the "Baron's Wars" and the "Polyolbion" of Michael Drayton, the former a metrical chronicle, and the latter an immense piece of metrical topography, which contains also striking national legends and ingenious allegorical and mythological inventions; the few and brief poems of Sir Henry Wotton; the "Orchestra" and the "Soul of Man and the Immortality thereof" of Sir John Davies, the latter a happily condensed piece of metaphysical reasoning; the satires of Bishop Hall, the earliest in the language except the "Steele Glass" of Gascoyne; the satires, elegies, and various lyrics of John Donne, which are rather metrical problems than poems, strongly manifesting the metaphysical tendency then common in poetry, but which reveal a subtle intellect and fruitful fancy, though obscure in thought, rugged in versification, and full of as bad affectations and conceits as are to be found in the century; the poems of the brothers Phineas and Giles Fletcher, the principal of which are the "Purple Island," an allegorical description of the human soul and body, and "Christ's Victory and Triumph," which is one of the most beautiful of religious compositions; and the sacred poems of the country parson, George Herbert. In Scotland, Alexander Scott and Sir Richard Maitland wrote brief poems; Alexander Montgomery, the "Cherry and the Sloe;" Alexander Hume, the "Day Estival;" King James VI., the "Essayes of a Prentice in the Divine Art of Poesie;" the earl of Stirling, his "Recreations with the Muses;" Sir Robert Aytoun, his few songs; and William Drummond, one of the most distinguished poets of his time, his sonnets, madrigals, and larger pieces. Marlowe's

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translations from Ovid and Lucan; Sandys's from Ovid and the Psalms; Harrington's version of Ariosto, Fanshawe's of Camoëns, and the more important versions of Homer by Chapman and of Tasso by Fairfax, also belong to this period. The literary genius of the age of Puritan ascendency, between the Elizabethan epoch and that of the restoration, culminated in Milton, who has no rivals in epic poetry but Homer and Dante. His career illustrates the literary character of his age. Prior to 1640, he had produced his "L'Allegro," "Il Penseroso," and "Comus," the most pleasing of his productions, abounding in passages frequently quoted, exquisite for imagination, sentiment, and musical rhythm; his "Lycidas," an enjoyment of which is said to be a test of a genuine appreciation of poetry; and his "Ode on the Nativity," one of the finest in the language. During the period of civil conflict and Cromwellian rule, from 1640 to 1660, he wrote no poetry at all except a few sonnets, but produced his various polemical prose treatises; and it is remarkable that there was at that time an almost entire cessation of pure literature in England. The contemporary poets, without an exception of any consequence, had their eras of activity only before the struggle and after it, or in exile or in prison during it, and the intellect of the country was occupied in producing a huge mass of controversial prose, only a very slight proportion of which has taken a place in the literature. One literary man only was undisturbed and uninterested by the events of the time. While England was in throes and confusion, Sir Thomas Browne was quietly meditating in his garden at Norwich upon sepulchral urns and the quincuncial lozenge. The "Paradise Lost," though published after the restoration, was an early conception of Milton, and bears the impress of this period of fierce discussion and of moral and theological strife. Its subject, the fall of man, is perhaps without an equal in epical grandeur, and its most prominent personage, if not its hero, is the fallen archangel Satan, whose ruined splendor and power of daring and of sufferance make him one of the sublimest creations of poetry. The latest poems of Milton, "Paradise Regained" and "Samson Agonistes," are of inferior worth. Among the contemporaries of Milton were Thomas Carew, Francis Quarles, George Wither, Sir John Suckling, Robert Herrick, Richard Lovelace, Sir Richard Fanshawe, Richard Crashaw, Abraham Cowley, Henry Vaughan, Sir John Denham, Sir William Davenant, Edmund Waller, and Samuel Butler. The songs and short amatory pieces of Carew were the precursors of numerous similar productions written by gay and accomplished cavaliers and courtiers, as the "Ballad upon a Wedding," and many other poems of Suckling, admirable for their witty levity; the odes and songs of Lovelace; the miscellaneous poems of Fanshawe; and, superior to all others, the graceful occasional poems of Cowley and Waller. The melodious verse of Waller was especially admired, and was diligently studied by Pope. Cowley (1618–'67) was the most popular poet of his time, though full of metaphysical conceits. His Anacreontics, the happiest of his pieces, are lively, joyous, and highly embellished. The "Cooper's Hill" of Denham is meditative in character, and in vigorous and rhythmical couplets, and the "Gondibert" of Davenant was for a time regarded as a monument of genius. The religious poems of Quarles, Crashaw, and Vaughan may be classed together. The productions of Herrick and Wither exhibit playfulness of fancy and delicacy of sentiment, varied in the former by frequent grossness and indelicacy. The "Hudibras" of Butler, a work of inexhaustible wit, which was perpetually quoted for half a century, belongs chronologically, as also do many others of the later poems of Milton and his contemporaries, to the age when Dryden and the comic dramatists were prevalent. The rapidity of conception and ease of expression of Dryden made him a contributor in various departments of literature. The greatest of his satires are "Absalom and Achitophel," and "Mac Flecknoe," and the first lines of his fine controversial poem, the "Hind and Panther," are among the most musical in the language. A thinker as well as poet, his arguments flow in harmonious verse, and his conceptions have a strikingly intellectual character and stand in logical sequence. His various, though not his greatest, excellences appear in his "Fables" and his "Ode for Saint Cecilia's Day." Among his contemporaries, the verses of some of whom have retained their popularity, were Marvell, Rochester, Charles Cotton, Sedley, John Philips, Oldham, Roscommon, Mulgrave, Dorset, and Pomfret.—The old English prose writers are generally distinguished for sterling sense, and for a style copious to redundancy, adorned with all the wealth of the imagination rather than with judicious taste. Their diction is deformed by abounding pedantry, their collocation of words and phrases is in imitation of the Latin, and their periods are tediously prolonged and unrhythmically constructed; yet they are nervous and effective, though ungraceful writers, seldom degenerate into indefinite and aimless phraseology, but crowd their sentences with meaning. The most admirable prose writer of the Elizabethan period is Richard Hooker (1553–1600), whose "Ecclesiastical Polity" is one of the masterpieces of English eloquence; and its sober richness of style, its fulness of imagery united with condensation of thought, was unapproached by any other writer during the next century. The *Novum Organon* of Lord Bacon (1561–1626), the most influential and original philosophical work that has been produced in England, was written in Latin. His "Advancement of Learning," a "globe of the intellectual universe," with a note of those parts not yet improved by the labor of man, he compared to the noise which musicians make while they are tuning their instruments, "which is nothing pleasant to hear, but yet is a cause why

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the music is sweeter afterward;" and at the close of his survey he predicted that "the third period of time will far surpass that of the Grecian and Roman learning." His style, usually sententious and somewhat stiff, became more imaginative, richer, and softer with his increasing years; but though his fancy was of the brightest, he allowed to it no other office than that of ministering to reason. His application of thought to purposes of utility and progress, with a view to the practical restitution of man to the sovereignty of nature, has entered as a characteristic element into the public mind of England. His "Essays" are among the masterpieces of English prose, and are equally eminent for power of expression and for compact and solid wisdom. Contemporary productions were the "Arcadia" and the "Defence of Poesy" of Sir Philip Sidney, the former of which was universally read and admired; the "History of the World" of Sir Walter Raleigh, written in the Tower; the "Chronicle of England" and "Survey of London" of John Stow; the chronicles of Raphael Holinshed; the collection of voyages by Richard Hakluyt; the "Purchas his Pilgrims" of Samuel Purchas; the "Relation of a Journey," &c., of George Sandys; the "Epistolæ Ho-Elianæ" of James Howell; the "History of the Turks" of Richard Knolles; and the sermons of Bishop Andrews and Dr. Donne, mosaics of quaintness, quotation, wisdom, folly, subtlety, and ecstasy. The writings of John Lilly produced a marked effect on much of the Elizabethan literature. His "Euphues," a dull story of a young Athenian, in a smooth style, full of affected conceits and recondite similes, was the model after which wits and gallants formed their conversation and writing. The ladies of the court were among his pupils, and Blount (1632) remarks that the beauty who could not "parley Euphuisme" was as little regarded as one that could not speak French. Under James I. was produced the translation of the Bible which has been generally in authority from that time. Between Bacon and Locke, the most acute of English metaphysicians was Thomas Hobbes (1588–1679), whose political theories are collected in his "Leviathan." His style is uniformly excellent, a merit which belongs to no one of his predecessors. Among his contemporaries were the sceptical philosopher Lord Herbert of Cherbury, who wrote also a history of the reign of Henry VIII.; the antiquaries William Camden, Sir Henry Spelman, Sir Robert Cotton, and John Speed; John Selden, the author of a "Treatise on Titles of Honor," and whose admirable "Table Talk" was published after his death; the chronologist Archbishop Usher; William Chillingworth, whose "Religion of Protestants" is a model of perspicuous reasoning; Peter Heylin, a wit and divine, the author of "Microcosmus;" John Hales, a preacher and controversialist; John Gauden, the supposed author of the famous "Eikon Basilike," which professed to emanate from the pen of Charles I.; and the two most eloquent of the old English divines, Joseph Hall (1574–1656), and Jeremy Taylor (1613–1667), whose works are monuments of their own abilities and of the pedantic tastes of the age. The "Contemplations" of Hall are superior to any of the writings of Taylor in continuity of thought, but the latter has perhaps had no equal in the pulpit in the splendor of his imagination, and is often called the Shakespeare of divines. The most curious works of the time are the "Anatomy of Melancholy" of Robert Burton (1576–1640), composed largely of apt and learned quotations from rare authors, constantly intermingled with the writer's own thoughts, and which exhibits in every part great spirit and power, and has the charm of a full and vigorous style; and the "Religio Medici," "Urn Burial," and other works of Sir Thomas Browne (1605–1682), whose popularity has revived in our own day—elaborately quaint compositions, fascinating from their pensiveness akin to melancholy, their paradoxes, and their occasional subtlety and imaginative brilliancy. Under the head of essays or sketches may be classed the "Gull's Hornbook" of the dramatist Decker, the "Characters" of Sir Thomas Overbury, the "Resolves" of Owen Feltham, the "Microcosmography" attributed to Bishop Earle, the miscellaneous pieces of Sir Henry Wotton, and the "Discourses by way of Essays" of Cowley. The last are written in a placid and perspicuous style, very unlike the affected obscurities of his poems, and may be reckoned among the earliest models of good writing in English prose. John Locke (1632–1704) is the author of treatises on civil government, education, and the reasonableness of Christianity, which diffused a spirit of liberty and toleration in opinion and government; but his most important work is the "Essay on the Human Understanding," which soon became the acknowledged code of English philosophy, and displays and inculcates a careful, tentative observation of intellectual habits. It helped to convert metaphysics from scholastic problems into practical and clearly intelligible analyses, but its indefiniteness in the use of the phrase "ideas of reflection" has left the essential character and tendency of the Lockean system in dispute between sensationalists and idealists. Two writers who at this time deviated from the track which English speculation has chiefly followed, and in whom Platonic tendencies predominated, were Ralph Cudworth, the author of the "Intellectual System of the Universe," and Henry More, the author of the "Mystery of Godliness," the "Mystery of Iniquity," and other works which were once very popular. The sermons of Barrow, South, and Tillotson were respectively esteemed for strength, wit, and rational unction, but the last have retained least of their former popularity. To this period belong most of the prose writings of Milton, which test the power of the language in vigorous and lofty declamation, the *Origines Sacræ* of Stillingfleet, the theological treatises of Sherlock, the "Exposition of the Creed" of Pearson, the "Exposi-

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tion of the XXXIX. Articles" of Bishop Burnet, the "Saint's Everlasting Rest" and other works of Baxter, the expository works of Leighton, Owen, and Henry, and the writings of the Quakers George Fox, Robert Barclay, William Penn, and Thomas Ellwood. This age of divines and comic dramatists was also distinguished for its devotion to practical science under the guidance of the spirit of Bacon, and chemistry and physics became as fashionable as wine and love, and as much respected as defences of the Trinity. Instances of this tendency are the "Discovery of a New World" and the other so called "mathematical works" of Bishop Wilkins, the "History of the Royal Society" of Sprat, the "Sacred Theory of the Earth" of Thomas Burnet, the "Sylva" and "Terra" of Evelyn, the "Observations" and the "Wisdom of God Manifested in the Works of Creation" of John Ray, and above all others, the "Considerations on the Usefulness of Experimental Philosophy," and other works, philosophical and religious, of Robert Boyle, and the *Philosophiæ Naturalis Principia Mathematica* of Sir Isaac Newton. Among antiquarian works were the *Monasticon Anglicanum* of Sir William Dugdale, the *Athenæ Oxonienses* of Anthony à Wood, the history of the order of the garter by Elias Ashmole, the "Miscellanies" of John Aubrey, and the *Fœdera* of Thomas Rymer, who also wrote a curious treatise on tragedy, in which Shakespeare is criticized according to certain stately notions derived from the ancients. Works of high literary interest are the "Worthies of England" of Thomas Fuller, one of the strangest books in the world, a melange of oddity, sagacity, and humor, in a pithy style; the "History of the Rebellion" of Lord Clarendon, which, in spite of its deliberate partiality, is admirable for its portraitures of character and its animated narrative; the "Observations on the United Provinces of the Netherlands" of Sir William Temple; the histories of the reformation and of his own times by Gilbert Burnet; the "Pilgrim's Progress" of John Bunyan, a specimen of homely English, the fruit of a lively and powerful imagination cultivated only by the study of the Scriptures; and the half poetical "Complete Angler" of Izaak Walton, who also wrote some pleasing biographies. Minor works were the translations and political pamphlets of Sir Robert L'Estrange, the "Contemplations" of Sir Matthew Hale, the "Essays" on ancient and modern learning by Temple, and the "Reflections" in answer to them by Wotton. Tom D'Urfey and Tom Brown, "merry fellows," the last of the wits of the restoration, wrote comic and licentious compositions in prose and verse. The "Short View," &c., of Jeremy Collier was the beginning of a controversy between him and the comic dramatists which resulted in the reformation of the theatre.—With the reign of Anne (1702–'14) begins a new era in English composition, when the affluence of the older literature gave way to correctness. The rules of the art were better understood, style was cleared of its redundancies, and wit refined from its alloy. The writers of the Elizabethan period, in an age of stupendous changes, on the confines between barbarism and refinement, had dealt with the original passions and principles of human nature, and had found their illustrations in the pageantry of past institutions and in dreams of the future. As the English advanced to the character of a polished nation, losing the bluffness and heartiness of their older manners, their literature also became less wild and grand in its romance and more regular in its outlines, the suggestions of genius being moulded by the rules of taste. As enriched and refined by the writers of the reign of Anne, which is often called the Augustan age of the literature, the language was almost finally formed. The fashions and frivolities of elegant and artificial life became the themes of poets and essayists, and while the highest regions of poetry and speculation were abandoned, books were no longer confined to the learned or curious, but were gradually spread among all classes. Men of letters now first became known in England as a distinct class in society. To bring philosophy out of closets and libraries, schools and colleges, and to make it dwell in clubs and assemblies, at tea tables, and in coffee houses, was the object which Steele proposed to himself. That school of poetry which may be traced to the adoption of French rules under Charles II., which acquired stability from the transcendent powers of Dryden, and which was now perfected by Alexander Pope (1688–1744), retained its ascendency nearly through the 18th century. The follies of his feeble copyists have reacted injuriously upon the fame of the great master of the school. For half a century the notion prevailed that whoever deviated from the standard of Pope was worthy only to figure in the "Dunciad;" but somewhat later it became common to deny to him poetic genius, imagination, and versatility, and to decry his wit, epigrammatic force, and faultless numbers, by confounding them with the imitations of the dunces who had caught something of his metre but nothing of his spirit. His correctness was branded as the badge of unimaginative and artificial verse, and may almost be numbered among the lost arts. Yet Campbell and Byron were zealous to do him justice, and the latter compared the poetry of the 18th century to the Parthenon, and that of his own times to a Turkish mosque, and boasts that though he assisted in rearing the gaudy and fantastic structure, he had never defaced nor depreciated the monuments of a purer taste. The vigor of conception and point of expression which distinguish the "Essay on Man," the "Rape of the Lock," the "Epistle from Eloisa to Abelard," the "Satires," and the "Dunciad," will at least vindicate for them the highest rank in a peculiar and admirable class of compositions. His "Iliad" and "Odyssey," though un-Homeric, are valuable additions to English literature. The finest contemporary poetical productions were the "Letter from Italy," the

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"Campaign," and the "Cato" of Addison, the octo-syllabic satires and occasional pieces of Swift, the "Shepherd's Week, in Six Pastorals" of Gay, the "Hermit" and the "Night Piece on Death" of Parnell, and the "Gentle Shepherd" of the Scotch poet Allan Ramsay. The names of Prior, Tickell, Garth, Blackmore, Ambrose Philips, Somerville, and Anne countess of Winchelsea, also belong here. It is remarked by Wordsworth that between the publication of "Paradise Lost" and of the "Seasons" of James Thomson (1700–1748), with the exception of the "Windsor Forest" of Pope and a passage in the "Nocturnal Reverie" of the countess of Winchelsea, not a single new image of external nature was produced in poetry. The "Seasons" are almost the only memorial which the age has left of poetical sympathy with natural scenery. It was original as well in style as in substance, for its blank verse has an easy flow peculiar to itself. The "Castle of Indolence" is a successful imitation of the manner of Spenser, and has great and peculiar beauty. The "Night Thoughts" of Edward Young (1681–1765) is also in effective blank verse, dissertational rather than simply poetical, in a sustained imaginative and epigrammatic style. The "Grave" of Robert Blair and the hymns of Watts are serious and devotional compositions of the same time. Through the "Bastard" of Richard Savage, the "London" and "Vanity of Human Wishes" of Dr. Johnson, the eclogues and odes of William Collins, the "Pleasures of the Imagination" of Mark Akenside, the odes and the "Elegy" of Thomas Gray, the "Deserted Village" and the "Traveller" of Oliver Goldsmith, the "Minstrel" of James Beattie, the "Botanic Garden" of Erasmus Darwin, and the "Task" of William Cowper, the line of English poetry was continued almost to the commencement of the present century. Johnson and Goldsmith both belonged to the school of Pope; but their poetry has distinctive characteristics, that of Johnson being marked especially by vigor and strong sense, and that of Goldsmith by sweetness and grace. The "Ode on the Passions" and several other pieces of Collins are masterpieces in their kind, and especially remarkable for the pictorial effects produced by the personification of abstract qualities. Collins and Gray were the two finest lyric poets of the century, and Gray's "Elegy written in a Country Churchyard" and his Pindaric ode of "The Bard" are exquisite examples of finished art and poetical vigor. Cowper was the precursor of the regeneration of poetry, and, abandoning the stock images and metrical sing-song with which art and fashion had been described, he produced pictures of English life and scenery marked by a simplicity, freedom, and freshness which anticipated the dawn of a new period. Among the productions of minor poets of the 18th century are the "Grongar Hill" of John Dyer, the "Schoolmistress" of Shenstone, the "Colin and Lucy" of Tickell, the ballad-like "William and Margaret" of Mallet, the Scotch songs of Ross, the "Mary's Dream" of Lowe, the "Auld Robin Gray" of Lady Anne Barnard, the "Tullochgorum" of Skinner, the "Tweedside" of Crawford, the various poems of Ferguson, the odes, and the epitaph on his wife, of Mason, the odes of Smollett, the "Art of Preserving Health" of Armstrong, the "Cumnor Hall" and the translation of the "Lusiad" of Mickle, the "Braes of Yarrow" of Hamilton, the elegies of Hammond, the "Careless Content" of Byrom, the "Country Justice" of Langhorne, the "Lawyer's Farewell to his Muse" of Blackstone, the "Shipwreck" of Falconer, the "Actor" of Robert Lloyd, the "Rosciad" and other satires of Charles Churchill, the brief poems of Thomas and Joseph Warton, the "Leonidas" and "Athenais" of Glover, the short lyrics and translations of Sir William Jones, the "Chameleon" of Merrick, the pastorals of John Cunningham, the "New Bath Guide" of Anstey, and the "Triumphs of Temper" and other works of Hayley, who, though the feeblest of the imitators of Pope, was once considered a great poet. In the latter half of the 18th century also Macpherson produced the pieces which he ascribed to Ossian, Chatterton wrote the poems which he ascribed to Rowley, and Percy collected many old songs and ballads in his "Reliques of English Poetry."—The English drama of the 18th century bore the impress of the neo-classical school reigning in France, and presented a complete separation of tragedy and comedy. The "Cato" of Addison, the "Elfrida" of Mason, and the "Irene" of Dr. Johnson, though once acted, are rather dramatic poems than plays. The "Sophonisba" and 4 other tragedies of Thomson are the undramatic attempts of a descriptive poet. More successful tragedies were the "Revenge" of Young, the "Barbarossa" of Brown, the "Gamester" of Moore, the "Elvira" of Mallet, and the "Douglas" of Home, the most effective of them all. In this period were produced the finest examples of the legitimate English comedy, written usually in prose, and exhibiting refinement of sentiment and wit. The forerunners of the comedies of Goldsmith and Sheridan were the "Conscious Lovers" of Steele, the "Suspicious Husband" of Hoadley, the "Jealous Wife" of the elder Colman, the "Clandestine Marriage" of Colman and Garrick, the "Way to Keep Him" of Murphy, the "False Delicacy" of Kelly, and the "West Indian" of Cumberland. Goldsmith's "She Stoops to Conquer" has every requisite for making an audience merry, and, according to Davies, "revived fancy, wit, gayety, humor, incident, and character, in place of sentiment and moral preachment." The "School for Scandal," the "Rivals," and the "Critic" of Sheridan are distinguished for epigrammatic witticisms, insight into social weaknesses, and ingeniously contrived whimsical situations; and the first is in many respects superior to any other comedy of modern times. The "Lying Valet" and "Miss in her Teens" of Garrick, the "Belle's

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Stratagem" of Mrs. Cowley, the "Tom Thumb" of Fielding, the "Man of the World" of Macklin, the "High Life Below Stairs" of Townley, the "Devil to Pay" of Coffey, and especially the 20 farcical plays of Foote, were the best and most popular comic productions of this epoch.—The prose authors of the 18th century may nearly all be classed as essayists, philosophers, historians, divines, and novelists. Periodical papers containing news had existed in England from the time of the civil war, but the "Tatler," planned by Sir Richard Steele (1671–1729), was the first periodical designed to have literary merit and to discuss the features and "smaller morals" of society. It appeared 3 times a week, extended to 271 numbers from April 12, 1709, to Jan. 2, 1711, and each number contained some lively sketch, anecdote, or humorous discussion, and was sold for a penny. It was succeeded by the "Spectator," which appeared every week-day morning in the shape of a single leaf from March 1, 1711, to Dec. 1712; after a suspension it reappeared 3 times a week in 1714, and extended to 635 numbers. The "Guardian" was begun in 1714, but became political, and ceased after the 176th number. Steele was the principal contributor to the "Tatler" and "Guardian," and Addison to the "Spectator," but papers were also furnished by Swift, Pope, Berkeley, Budgell, Tickell, and Hughes. The essays, especially those of Addison, were often models of grace, delicacy, and amenity, and were highly influential in correcting and refining the tone of society. Numerous works similar in form and purpose appeared later in the century, of which the only ones that have retained their place in literature are the "Rambler," written almost wholly by Dr. Johnson, the "Adventurer," by Hawkesworth, Johnson, and Warton, the "Idler," chiefly by Dr. Johnson, the "World," by Moore, Horace Walpole, Lyttleton, and the earl of Chesterfield, the "Connoisseur," by Colman and Thornton, which received also a few essays from the poet Cowper, and the "Mirror" and the "Lounger," both published in Scotland, and supported by a band of literary lawyers, among whom were Mackenzie, Craig, Cullen, Bannatyne, Hailes, Abercromby, and Tytler. The letters of Lady Mary Wortley Montagu, who was an associate of the wits of the time, are models of an easy and elegant epistolary style. The two chief philosophical writers of the early part of the century are Bishop Berkeley and the earl of Shaftesbury, and the "Minute Philosopher" of the former is the happiest imitation in English of the dialogues of Plato. The style of his other metaphysical treatises is singularly animated and imaginative. In his "Theory of Vision" he advanced novel and ingenious views on optics which are now universally adopted. His doctrine of idealism, the object of which was to prove that nothing existed but God and ideas in the mind, marked an era in English philosophy, and gave rise to a protracted discussion which has hardly yet ceased. He was personally one of the most esteemed men of his time, and exerted great influence in favor of religion and in giving popularity and fashion to metaphysical studies. The "Characteristics" of the earl of Shaftesbury, once greatly admired for their moral and religious sentiments, and their elegant though affected diction, are now little read. He suggested the theory of a "moral sense," which was adopted and illustrated by subsequent Scotch philosophers. The levity with which he sometimes alluded to Christian doctrines greatly impaired his influence. A similar levity is even more apparent in the letters of Lord Bolingbroke, the philosophical works of a restless factionist, who was long considered a master of the art of written eloquence. The current philosophy of the 18th century was strongly affected by sceptical tendencies, whose influence pervaded the literature of England as of nearly every European country. Bishop Butler, in the preface of his "Analogy," declared that many persons then took it for granted that Christianity was no longer a subject of inquiry, but had at length been discovered to be fictitious; and in 1753 it was stated in the house of commons to be the fashion for a man to declare himself of no religion. This spirit of scepticism especially infested the department of historical composition, which at this time received a great impulse. A malevolence toward Christianity is the chief fault of the "Decline and Fall of the Roman Empire," by Edward Gibbon (1737–'94), the greatest historical work in the English language. No other historian has ever drawn his materials from a wider variety of sources, or written at once with so much erudition and genius. The history of England by David Hume, and of Scotland and of the reign of Charles V. by William Robertson, have retained their reputation for ease and elegance of style, though later researches have shown their neglect of accuracy. Less important historical and biographical writers were Echard, Strype, Smollett, Tytler, Ferguson, Middleton, Watson, Lyttleton, Russell, and Jortin. The principal philosophical and critical works after those of Berkeley and Shaftesbury were Hutcheson's "Inquiry into Beauty and Virtue" and "System of Moral Philosophy," Hume's "Essays" and "Treatise on Human Nature," Adam Smith's "Theory of Moral Sentiments," Reid's "Inquiry into the Human Mind" and "Essays on the Intellectual Powers," Beattie's "Dissertations, Moral and Critical," Hartley's "Observations on Man, his Frame, his Duty, and his Expectations," Price's "Review of the Principal Questions and Difficulties in Morals," Ferguson's "History of Civil Society" and "Institutes of Moral Philosophy," Tucker's "Light of Nature Pursued," Priestley's "Matter and Spirit," Lord Kames's "Essays on the Principles of Morality and Natural Religion" and "Elements of Criticism," Hugh Blair's "Rhetorical Lectures," and George Campbell's "Philosophy of Rhetoric." The critical and controversial writings of Bentley and Atterbury belong to the early part of this period. The theological writ-

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ers of greatest influence were Clarke, Lowth, Hoadley, Leslie, Whiston, Doddridge, Butler, Warburton, Wesley, Lardner, Farmer, and Leland. Dr. Johnson, Goldsmith, and Burke, surpassed all others as miscellaneous writers, and probably Dr. Johnson exerted by his conversation and his pen a greater influence upon the literature and tone of thought of his age than any other individual. It was his wit and eloquence, argument and learning, says Lord Mahon, which first stemmed the tide of infidelity, and turned the literary current in favor of revealed religion. It was said by Burke that he appears far greater in Boswell's pages than in his own, and the reason is that he conversed with admirable simplicity and plainness, but in his writings adopted an elaborately vicious and ponderous style—a style which, according to his own favorite choice of terms, would be described as grandiose, magniloquent, and sesquipedalian. In the 18th century the novel assumed nearly the form and character which have since made it a leading department of literature. The "Arcadia" of Sir Philip Sidney had been followed by a large number of chivalrously heroic and courtly pastoral romances, many of them translations and adaptations, as Johnson's once famous "Seven Champions of Christendom," and in the 17th century, the "Man in the Moon" of Francis Godwin. After the restoration the most popular novels of the continent were translated, but of English original fictions, the "Parthenissa" of Lord Orrery and the tales of Mrs. Behn and Mrs. Manley are all that are now remembered even by the antiquary. Daniel Defoe (1661–1731) first gave to English fiction a simple, direct, matter of fact, and human interest, and the verisimilitude of "Robinson Crusoe" and his other novels has never been excelled. The "Tale of a Tub" and "Gulliver's Travels" by Swift, the "History of John Bull" by Arbuthnot, and the "Memoirs of the Extraordinary Life, Works, and Discoveries of Martinus Scriblerus," are satires in the form of fictitious narratives. All the writings of Swift are admirable for their vigor and humor. Under his successors the novel became more complex and artistic, embraced greater varieties of character and diversities of treatment, and pictured the artificial refinements and distinctions of society, the contrasts of temper and manners, and the complicated and conflicting relations of life. The "Joseph Andrews," "Tom Jones," and "Amelia" of Fielding, and the "Pamela," "Clarissa Harlowe," and "Sir Charles Grandison" of Richardson, were published near the middle of the century. Fielding claimed for his great work, "Tom Jones," the dignity of a comic epopee. Its plot, which involves wonderfully diversified characters and adventures, is contrived with almost perfect art, and it portrays the especial features of real life in England, with keenness, coarseness, an easy humor, and a buoyant affluence of practical knowledge. Richardson is one of the most powerful, tragic, and tedious of novelists, and his voluminous works obtained almost unexampled popularity in England and on the continent. He and Fielding were embodiments respectively of the idealistic and the realistic tendency, and each entertained great contempt for the writings of the other. The "Peregrine Pickle," "Humphry Clinker," and other novels of Smollett are distinguished for coarse, comic incidents and broad humor, and the "Tristram Shandy" and "Sentimental Journey" of Sterne contain masterly touches of character, passages and episodes sparkling with wit and fancy, and also much melodramatic pathos and sentimentality. Three works of fiction contributed especially to refine the public taste and the style of novels: the "Rasselas" of Dr. Johnson, a philosophical essay in the garb of an oriental tale, the "Vicar of Wakefield" of Goldsmith, a picture of English rural life remarkable for kindliness and taste, and the "Castle of Otranto" of Horace Walpole, a striking Gothic and chivalric romance. In 1771 Mackenzie produced the interesting character of the "Man of Feeling," and a few years later appeared Miss Burney's "Evelina," "the first tale written by a woman, and purporting to be a picture of life and manners, that lived or deserved to live," and which showed that both the vulgar and fashionable life of London might be delineated with lively skill, and with broad comic humor, without a line to offend a delicate taste. This and her second novel, "Cecilia," are especially esteemed for their characterizations.—With the French revolution begins a new period in English literature. Again, as in the age of Elizabeth, great civil and religious changes were agitated; old habits and feelings were to be set aside, old manners to pass into oblivion; and out of the ruins of venerable institutions political theorists were seeking to rear the structure of a new social order. Amid bloodshed and confusion, in the conflict between traditions and hopes, men were forced to speculate on the very elements of human nature and destiny. The commotion of the times marked a change of scene in the drama of European civilization, and, though it did not shake the constitution of England, it stirred the mind of the country in every department, and led to deeper moods of thought and to larger sympathies. The revival of poetry had already been prepared by Cowper. A greater influence, probably, was exerted by Robert Burns (1759–'96), "a miracle of human nature," whose "Tam O'Shanter," "Hallowe'en," and "Cotter's Saturday Night," were as indigenous to the soil of Scotland as the thistle, and displayed a freshness of humor, pathos, force, and beauty, which made them esteemed alike by peasants and scholars, and that union of the morally sublime with the extrinsically humble which soon became an aim and principle with Wordsworth. Yet his influence did not extend at once to England, where Cowper was still rivalled in popularity by Darwin and Hayley, who pompously versified prosaic subjects, and made steam engines boil and flowers woo and win each other

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in song. Connected with these was the Della Cruscan school of affected rhymesters, prominent among whom were Anna Seward, called the swan of Lichfield, Mrs. Piozzi (formerly Mrs. Thrale), Mrs. Robinson, Greathead, Merry, Weston, and Parsons, who were exposed and savagely ridiculed by Gifford in his "Baviad" and "Mæviad." Matthew Gregory Lewis was the leader of a romantic school, both of poetry and prose fiction, abounding in *diablerie* and all manner of extramundane machinery, to which the perturbed temper of the times gave a momentary success. His verses were reflected in some of the most powerful contemporary prose, and exerted an influence on the early productions of Scott, Southey, and Coleridge, but were demolished by the "Rovers" of Canning and Frere, who also ridiculed Darwin's "Loves of the Plants" by a burlesque entitled the "Loves of the Triangles." William Wordsworth (1770–1850), esteemed by many the greatest poet of his century, devoted his life with singleness and firmness of purpose to the art of poetry. It was the solemn business of his being, the object of all his thought, observation, reading, and experience; and the ultimate goal which he proposed to himself was the composition of a vast philosophical poem, treating of man, nature, and society. His aim was to renovate and refresh literature by bringing back poetry from over-refinements of sentiment and rhetoric to truth and nature; and he began by composing lyrical ballads on the humblest subjects in language such as was "really used by men." Readers, long familiar with poems on learned themes or marked by polished sentimentalities, marvelled at his bald topics and colloquial platitudes as literary eccentricities, and could hardly tell whether they were designed to be comic or serious; and his first collection, which was certainly a melange of good and bad, contained passages of simple nature and unsophisticated pathos as grotesque as the fripperies of Della Cruscan art. Yet the simplicity of feeling, the truthfulness of delineation, the comprehensive spirit of humanity, and the union of deep and subtle thought with sensibility, which marked his better pieces, attracted by degrees a circle of enthusiastic admirers. The works of no other poet have been so exclusively the product of personal experience and retrospection. His intense and unwearied delight in the shapes and appearances of rural and mountain scenery was constantly supplied by the wild region where he dwelt, and where every natural feature received the coloring of his own imagination; and his poems are made up of didactic philosophizing founded on analyses of his own thoughts, or of characters and scenes which illustrate the elements and phases of his own character, with a running commentary of natural phenomena, revealing always that harmonious and almost blended activity of intellect and passion which distinguishes him as a philosophical poet. In striking contrast with Wordsworth, who steadfastly pursued his purposes, was the rhapsodical and indolent Samuel Taylor Coleridge, whose finest pieces, as "Christabel" and the "Ancient Mariner," were produced early in life, and are unsurpassed in the language as strong, wild, and musical sallies of pure imagination. The faultless rhythm of "Christabel," accentual instead of syllabic, was the acknowledged model of Scott's "Lay of the Last Minstrel." As a philosopher and critic he has inspired rather than instructed many followers to rise to higher standpoints than those of Locke, Paley, and Lord Kames. Robert Southey when a schoolboy conceived the design of exhibiting in narrative poems the grandest forms of mythology that ever obtained among men, and his "Thalaba" and "Curse of Kehama," founded on Arab and Hindoo legends, were the partial fulfilments of his plan, and display through a charming diction extensive learning and brilliant imagination. The irregular, unrhyming verse of "Thalaba" he described as the "Arabesque ornament of an Arabian tale." Southey was the most diligent and indomitable of literary men, and in almost every department of prose and poetry has left monuments of his talent and erudition. A new tendency appeared in the poems of Sir Walter Scott, who combined the refinements of modern poetry with the spirit and materials of border minstrelsy and of the early metrical romances. He adopted in his principal poems the octosyllabic measure, which had been generally used by the old romancers. From 1805 to 1812, when the first cantos of "Childe Harold" appeared, Scott was the most popular British poet; but he retreated to prose fiction, as the genius of Byron began to display its strength. The historical ballad which he brought into vogue has since been successfully cultivated by Lockhart, Macaulay, and Aytoun. Prof. Wilson, after producing a few poems marked especially by delicacy of sentiment and vigor of description, applied himself chiefly to prose literature, criticism, and philosophy. The celebrity of Lord Byron was unrivalled during his brief and impetuous career; and perhaps no other man, dying at 37, ever wrote so much that was remarkable for intellectual power and intensity of passion. A new phase of the poetic mind appeared in Keats, the greatest of British poets that have died in early youth, who gave promise not only by his profusion of conceptions of beauty and grandeur, but also by the progress which he rapidly made in bringing his genius under the control of judgment. He had an instinct for choice words, which were in themselves pictures or ideas, and his example has affected especially the forms of poetical expression, to which he gave a refined sensuousness. He was an early admirer of the poetry of Leigh Hunt, whose manner was derived from Italian models, and his influence appears strongly in the productions of Shelley, often most ethereal in imagery and language. Though the conceptions of Shelley were derived from imaginative philosophy and from speculations on elemental nature, rather

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than from human nature and real life, yet he was instinct with a love and intellectual sense of ideal beauty, which appear in single thoughts and images in his larger productions, and especially in some of his lesser poems, as the "Sensitive Plant," the "Skylark," and the "Cloud." Thomas Moore, a writer of surpassingly beautiful songs and of light and elegant satires, displayed his highest powers in the four oriental tales of which "Lalla Rookh" is composed, remarkable for their splendor of diction and copiousness of imagery. George Crabbe, "nature's sternest painter, yet the best," produced strong impressions by elaborately chronicling a series of minute circumstances; and in brief passages, as in "Sir Eustace Grey," rises to a fine imaginative energy. Samuel Rogers (1763–1855), the contemporary of a long series of poets, followed no one of the new tendencies, but attained high artistic excellence in the heroic couplet, with a nicety of taste and grace of sentiment worthy of Pope and Goldsmith. Campbell had a higher genius with an equal cultnre; amid the disasters of the time he conceived of lighting "the torch of hope at nature's funeral pile," and in his lyrical pieces he gave to romantic conceptions a classical elaboration and finish which was hardly attempted by his contemporaries. Charles Lamb, a peculiar and happily wayward genius, wrote almost nothing that is not exquisite, and his few poems, like his essays, reveal an original wit and genial character, moulded by sympathetic study of the old English writers. His reputation rests chiefly on his "Essays of Elia," than which the literature contains few things finer. The poems of Thomas Hood, whether serious or comic, are pregnant with matter for thought. Though a singularly clever rhyming punster and jester, his main strength lay in "the homely tragic," the simple pathetic, in lyrics like the "Song of the Shirt" and the "Bridge of Sighs." In his comic pieces, the "Last Man," "Miss Kilmansegg with her Golden Leg," and others, as perhaps in those of every truly humorous writer, may be detected a deep vein of earnest pathos and tragic power. The Scotch poet James Hogg (the Ettrick Shepherd), with a rare imagination, sometimes excelled marvellously in describing things that transcend nature's laws; and his story of "Kilmeny," a child stolen by the fairies and conveyed to fairy land, is a most charming example of pure poetry. The best compositions of Allan Cunningham are ballads and songs of an intensely national character, as the "Mermaid of Galloway," "She's Gane to Dwall in Heaven," and "My Nannie, O;" and William Motherwell was successful both in martial pieces, as the "Sword Chant of Thorstein Raudi" and the "Battle-flag of Sigurd," and in plaintive strains, as the ballad of "Jeanie Morrison." Many of the poems of Walter Savage Landor are attempts to reproduce the genius of ancient Greek poetry, and, though they have fine and highly intellectual passages, they seem foreign to England and not akin to modern times. He has a surer reputation for his remarkable prose works, the chief of which is a series of "Imaginary Conversations." Among the minor poets of this period are Henry Kirke White, Grahame, Bowles, Hamilton, Lloyd, Lovell, Dyer, Cary, Wolfe, who deserves special mention for his short poem on the "Burial of Sir John Moore," Montgomery, Hartley Coleridge, Heber, Keble, Milman, Croly, James and Horace Smith, Pollok, Procter, Elliott, Clare, Barton, Sterling, Bailey, Bayley, Milnes, Swain, Mackay, Aird, Bowring, Praed, Tennant, Herbert, Moultrie, Maginn, Anster, Barham, the author of the "Ingoldsby Legends," Trench, A. A. Watts, Tupper, Thomas Davis, Mangan, Mahoney, Allingham, Barnes, Edward Robert Bulwer (Owen Meredith), Herand, Matthew and Edwin Arnold, W. C. Bennett, Alexander Smith, and Gerald Massey. The most popular English poetess in the first quarter of this century was Mrs. Hemans, among whose numerous productions are some that are melodious in expression and touching in sentiment, tending especially to purify the passions and sanctify the affections. The dramatist Joanna Baillie wrote also ballads and metrical legends. Caroline Bowles (Mrs. Southey) displays in many of her slight pieces remarkable elevation and simplicity of feeling. Mary Howitt excels in ballad poetry, and in writings marked by innocent mirth and playful fancy, designed for the young. In contrast with her easy simplicity are the elaborate and impassioned poems of Mrs. Norton, who has been called the Byron of modern poetesses. L. E. Landon checked the diffuseness and efflorescent excess of her early productions, which are distinguished at once for vivacity and melancholy, and gave concentration of thought and style to the verses written not long before her mysterious death. Her "Ethel Churchill" gives her a place also among novelists. Other poetesses of the time are Mrs. Blackwood, Lady Flora Hastings, Harriet Drury, Camilla Toulmin (Mrs. Crosland), Mrs. Ogilvy, Adelaide Procter, and Eliza Cook. The greatest living English poets are the laureate Tennyson and Mr. and Mrs. Browning, who represent what may perhaps be termed a metaphysico-romantic tendency.—The most successful dramatic pieces of this epoch have been those of Joanna Baillie, remarkable for their unity of idea and intellectual completeness, the "Bertram" of Maturin, the happily constructed tragedies of Knowles, the "Lady of Lyons" and "Richelieu" of Sir Edward Bulwer Lytton, the "Julian" and "Rienzi" of Miss Mitford, the "Ion" of Talfourd, the "Fazio" of Milman, the comedies of the younger Colman, the plays of Mrs. Inchbald, the "Road to Ruin" of Thomas Holcroft, the "Honeymoon" of John Tobin, and various plays of O'Keefe, Reynolds, Morton, Poole, Planché, Marston, Jerrold, Buckstone, Taylor, and Boucicault. The "Remorse" of Coleridge, the "Bride's Tragedy" of Beddoes, the "Tragedy of Galileo" of Samuel Brown, the "Athelwold" of William Smith, the "Philip van Artevelde" of Henry Taylor, the "Legend

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of Florence" of Leigh Hunt, and the "Strafford," "Blot in the 'Scutcheon," &c., of Robert Browning, are rather dramatic poems than acting plays.—The most voluminous department of English prose during this period is that of novels. In the latter part of the 18th century, the circulating libraries abounded with the worthless productions of the so-called Minerva press; but the works of Charlotte Smith mark the beginning of the transition from the sentimental to the true in popular fictions. A new energy and dignity was given to them by the political tales of Holcroft and Godwin, and especially by the highly intellectual character of Godwin's "Caleb Williams;" and the romantic fictions of Mrs. Radcliffe, as the "Mysteries of Udolpho," the novels of the sisters Porter, and the "Monk" of Matthew Gregory Lewis were at least improvements on frippery love plots. The Arabian tale of "Vathek," by William Beckford, was greatly admired for its imaginative power and literary finish, and the "Canterbury Tales" of Sophia and Harriet Lee are remarkable among English fictions for tenderness and feeling. The delineations of character and society by Miss Edgeworth, Mrs. Opie, and Miss Austen preceded the works of Sir Walter Scott, whose example has given to the novel nearly the same importance in contemporary literature which the drama had in the Elizabethan era. His prodigious familiarity with Scotch characters, anecdotes, traditions, and superstitions, the delight which he took in displays of sense, humor, or sentiment, in every strong and original symptom of character, prove how broad a foundation his fictions had in actual life. Of subsequent novelists, four have surpassed all their contemporaries, and are each of them esteemed preëminent by their special admirers: Bulwer, Dickens, Thackeray, and Charlotte Brontë. It may be said that Charlotte Brontë and Thackeray present the happiest union of genius with artistic power and purpose, and that Dickens excels in genius and Bulwer in art. The "Vivian Grey," "Coningsby," and other novels of Benjamin Disraeli, and the "Alton Locke" and "Hypatia" of Kingsley, are also of high reputation for force and imagination. Among the less important works of prose fiction are the "Zeluco" and "Mordaunt" of Dr. John Moore, the "Simple Story" and "Nature and Art" of Mrs. Inchbald, the "Self-Control" and "Discipline" of Mrs. Brunton, the "Cottagers of Glenburnie" of Elizabeth Hamilton, the "Hungarian Brothers" of Anna Maria Porter, the once highly popular "Thaddeus of Warsaw" and "Scottish Chiefs" of her sister Jane Porter, the religious novels of Hannah More, the "Wild Irish Girl" and the other national tales of Lady Morgan, the "Albigenses," the "Fatal Revenge," and other romantic fictions of Maturin, the "Frankenstein" and "Last Man" of Mrs. Shelley, the "Marriage," "Inheritance," and "Destiny" of Miss Ferrier, the domestic tales of the countess of Morley and Lady Charlotte Bury, the "Annals of the Parish" and "Ayrshire Legatees" of John Galt, the "Salathiel" of George Croly, the "Anastasius" of Hope, the "Valerius" and "Reginald Dalton" of Lockhart, the Scottish tales of Professor Wilson, the eastern romances of Morier and Fraser, the "Sayings and Doings" and other novels of fashion of Theodore Hook, the "Glenarvon" of Lady Caroline Lamb, which was supposed to represent Lord Byron in its hero, the "Trevelyan" of Lady Dacre, the "Cyril Thornton" of Thomas Hamilton, the Irish stories of Banim, Crofton Croker, Griffin, Carleton, and Mrs. S. C. Hall, the sea stories of Capts. Marryat and Chamier, the "Tom Cringle's Log" and "Cruise of the Midge" of Michael Scott, the "De Vere" of Ward, containing a portraiture of Canning, the "Headlong Hall" and other humorous novels of Peacock, the "Brambletye House" and "Moneyed Man" of Horace Smith, the "Our Village" of Miss Mitford, the "Victims of Society" and other tales of Lady Blessington, the fashionable novels of Mrs. Gore, the "Deerbrook," the "Hour and the Man," and the politico-economical tales of Miss Martineau, the miscellaneous novels of James, Ainsworth, Hannay, Reade, Borrow, Collins, Warren, Anthony Trollope, Lever, and Lover, of Mrs. Trollope, Mrs. Bray, Mrs. Gaskell, Mrs. Marsh, Miss Sinclair, Miss Muloch, Julia Kavanagh, Lady Bulwer, and many others which at present occupy the public. Within this period Mitford, Gillies, Thirlwall, and Grote have produced elaborate general histories of Greece, Finlay has written on the later and Byzantine period of the Greeks, and St. John on the manners and customs of ancient Greece; Sharon Turner, Godwin, Lingard, Palgrave, Mackintosh, Charles Knight, Lord Mahon, Miss Strickland, and Harriet Martineau have produced works on different periods of English history, and Hallam on the constitutional history of England, and on the history of Europe during the middle ages; and various histories have been written by Southey, Tytler, Coxe, Chalmers, Roscoe, Pinkerton, Dunlop, Mill, Mills, Napier, Milman, Crowe, Elphinstone, and Arnold. Carlyle's "French Revolution" and "Frederic the Great" are distinguished for research and vigor of character painting. The second series of Alison's "History of Europe" from the French revolution to the accession of Louis Napoleon, has recently been completed (June, 1859); and 4 important historical works are now in process of publication: Macaulay's "History of England from the Accession of James II.," Froude's "History of England," Merivale's "History of the Romans under the Empire," and Buckle's "History of Civilization." Gladstone's "Studies on Homer and the Homeric Age" has at once a historical, critical, political, and religious character. The recent era excels especially in narratives of travels and in scientific works; of the former, the most prominent are those of Bruce, Mungo Park, Denham, Clapperton, Lander, Campbell, Burckhardt, Belzoni, Buckingham, Porter, Clarke, Mure, Forsyth, Eustace, Hobhouse, Holland, Dodwell, Gell, Beckford, Ross, Parry, Franklin, Beechey, Basil Hall, Inglis, La-

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yard, Fellows, St. John, Fraser, Burnes, Barrow, Harris, Burton, Kinglake, Warburton, Stanley, Atkinson, and Livingstone; of the latter, the principal are the works of Herschel, Brewster, Buckland, Davy, Lyell, Whewell, Nichol, Prichard, Pye Smith, Hugh Miller, Wilkinson, and Owen. In archæology, the names of Young and Wilkinson on Egyptian subjects, of Rich and Layard on Babylonian and Assyrian, and of Rawlinson on Persian, have attained high distinction. The work of Edward W. Lane on the "Manners and Customs of the Modern Egyptians" is unequalled as a minute and faithful delineation of an oriental people. In biographical works, this period is peculiarly rich. The most popular and important of these are the lives of Nelson and Wesley by Southey, of Sheridan and Byron by Moore, of Petrarch and Mrs. Siddons by Campbell, of Burke and Goldsmith by Prior, of Goldsmith and the statesmen of the commonwealth by Forster, of Napoleon and the English novelists by Scott, of British painters, sculptors, and architects by Allan Cunningham, of the statesmen and men of letters and science of the reign of George III. by Brougham, of the chancellors and chief justices of England by Lord Campbell, of British military commanders by Gleig, of eminent statesmen and great commanders by James, of Howard, Blake, and Penn by Hepworth Dixon, of Napoleon by Hazlitt, of Sir Walter Scott by Lockhart, of Charles Lamb by Talfourd, of Campbell by Beattie, of Mackintosh by his son, of Horner by his brother, of Sydney Smith by his daughter, of Charlotte Brontë by Mrs. Gaskell, of Dr. Arnold by Stanley, of Goethe by Lewes, and of Moore by Lord John Russell. Among miscellaneous writers on literature, Isaac Disraeli, Sir Egerton Brydges, and John Foster became prominent near the beginning of the century. The number of books has often been increased by miscellaneous collections from the reviews, journals, and magazines, as the "Noctes Ambrosianæ," from "Blackwood's Magazine," chiefly by Prof. Wilson, the "Essays" of Jeffrey and Sydney Smith, Macaulay and Carlyle, from the "Edinburgh Review," the witty productions of Douglas Jerrold, collected from "Punch," and many of the writings of Hazlitt and De Quincey. Cobbett and J. Wilson Croker achieved distinction as political pamphleteers, and the latter also by his vigorous and pungent articles in the "Quarterly Review." Important contributions have been made to English art literature by Lindsay, Eastlake, Leslie, and especially by Mrs. Jameson and John Ruskin. The principal metaphysical writers of the Scottish school were Dugald Stewart, Dr. Thomas Brown, and Sir William Hamilton; the more peculiar tendencies of the English mind appeared in Paley; Bentham is the author of important works on jurisprudence, J. Stuart Mill on logic and political economy, and Archbishop Whately on logic, political economy, and theology. The most remarkable sermons have been those of Alison, Robert Hall, Chalmers, and Robertson; and the "Tracts for the Times," and the writings in support of them or antagonistic to them, constitute an interesting department of theological literature. The names of Cardinal Wiseman, J. H. Newman, and Faber are particularly distinguished in Catholic theology; of Pusey and Froude in the Anglo-Catholic movement; and of Dr. Arnold, the brothers Hare, Conybeare, Maurice, and Jowitt in the broad church party of the Anglican church. F. W. Newman and James Martineau are exponents of less ecclesiastical tendencies.—The best historical and critical works on the literature of England are: Wright's "Biographia Britannica Literaria" (vol. i., the Anglo-Saxon period, 1842; vol. ii., the Anglo-Norman period, 1846); Warton's "History of English Poetry," extending to near the end of Queen Elizabeth's reign (3 vols., 1774–'81); Hallam's "Introduction to the Literature of Europe in the 15th, 16th, and 17th Centuries" (1837–'39, with additional notes in later editions); Collier's "History of English Dramatic Poetry" (1831); Chambers's "Cyclopædia of English Literature" (2 vols., 1843–'44); Lowndes's "Bibliographer's Manual" (4 vols., London, 1857 *et seq.*); and Allibone's "Critical Dictionary of English Literature" (2 vols., Philadelphia, 1858 *et seq.*). Among brief manuals are Shaw's "Outlines of English Literature" (1849), and Spalding's History of English Literatnre" (1853).—For an account of the origin and growth of English magazines, reviews, and journals, see NEWSPAPERS, and PERIODICAL LITERATURE. For English art, see MUSIC, PAINTING, and SCULPTURE.

ENGLAND, JOHN, D.D., first Roman Catholic bishop of Charleston, S. C., born in Cork, Ireland, Sept. 23, 1786, died in Charleston, April 11, 1842. He studied in the schools of his native city, and at the age of 15, having resolved to enter the priesthood, was placed by his bishop under the care of the Very Rev. Dean McCarthy, who fitted him to enter the college of Carlow in 1803. During his stay at this institution he founded a female penitentiary and poor-schools for both sexes, gave a course of lectures in the parish chapel, and preached to the soldiers then stationed in the town. He was recalled to Cork in 1808, ordained priest Oct. 9, and soon after appointed lecturer at the North chapel and chaplain of the prisons. In the following May he commenced the publication of a monthly magazine called the "Religious Repertory;" in 1812 he was appointed president of the theological college of St. Mary, in which he also lectured on divinity, and about the same time he entered into politics with all his characteristic warmth. He exerted himself with some success to put down bribery at elections, and in the "Repertory" attacked the existing system of criminal jurisprudence, and opposed the project, which then found considerable favor in Ireland, of purchasing Catholic emancipation by certain concessions to the English government. The freedom of his language more than once brought him before the courts,

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and on one occasion he was fined £500. Meanwhile he filled the office of bishop's secretary, performed the ordinary duties of the ministry, and founded several religious and charitable institutions in Cork. In 1817 he was made parish priest of Brandon. In 1820 he received a papal bull appointing him bishop of the new diocese of Charleston, S. C., comprising the states of North and South Carolina and Georgia, with a scattered Catholic population of about 8,000, and only 4 priests. He was consecrated in Cork, Sept. 21, and arrived at Charleston about the end of the next December. One of his first cares was the establishment of an academy and a theological seminary, in both of which he taught the principal branches, supporting the latter institution by the revenue from the former. He founded an anti-duelling association, corrected many evils which had crept into the church, visited every part of his vast, half-settled diocese, and gave special care to the negroes, for whom he always had regular services in his cathedral. With the view of defending his creed he established the "Charleston Catholic Miscellany," the first Catholic paper published in America. In 1826, at the request of congress, he preached before the senate at Washington. In 1832 he travelled in Europe and spent some time in Rome, when the pope appointed him apostolic legate to Hayti. He visited that island twice in discharge of his functions, returned to Rome in 1833, and made two more voyages to Europe in 1836 and 1841. His death was brought on by sickness contracted on a stormy passage home, hastened by unusual exertion in preaching immediately after his arrival. His learning and controversial powers, his high moral character, and above all the heroism which he displayed during a season of yellow fever, gave him a standing among persons of other denominations in Charleston which no member of his faith had held there before; and the strange spectacle was sometimes witnessed of the Catholic bishop in his robes preaching on Sunday in a Protestant church to a Protestant congregation at the request of the latter's pastor. His incessant activity won for him at Rome the sobriquet of *il vescovo a vapore*, "the steam bishop." Bishop England left a great number of theological, controversial, historical, and miscellaneous writings, most of which originally appeared in the periodical press. A complete edition of his works, edited under the direction of his successor, the Rt. Rev. I. A. Reynolds, D.D., in 5 vols. 8vo., appeared in Baltimore in 1849.

ENGLISH, George Bethune, an American literary, military, and political adventurer, born in Boston in 1789, died in Washington in Aug. 1828. He was graduated at Harvard college in 1807, studied law in Boston, and was admitted to the Suffolk bar, but never engaged in practice, becoming first a theoretical reformer and disputant, and then a student of divinity at Cambridge. During his theological course he began to doubt the truth of Christianity, and published a work in favor of Judaism, entitled the "Grounds of Christianity Examined, by Comparing the New Testament with the Old" (Boston, 1813), which was answered in the following year by Edward Everett, at that time pastor of the Brattle street church in Boston. English then vainly sought to obtain a commission in the U. S. army, was for some time engaged in editing a newspaper in the West, and finally sailed to the Mediterranean as a lieutenant of marines in a U. S. ship of war. Arriving in Egypt, he professed Mohammedanism, and having liberal offers made to him, accepted a commission in the army of Ismael Pasha, who was sent by Mohammed Ali in 1820 in command of an expedition against the tribes of Sennaar upon the upper Nile. As an officer of artillery, English performed important services. He employed camels to drag cannon, and attempted to revive the ancient scythe war chariot, so modified as to be propelled by horses under cover in the rear; but the model which he constructed was destroyed through jealousy. Though defrauded of his promised reward, he obtained a practical knowledge of the country and people, and became an agent of the American government in the Levant. He returned to America in 1827, and took up his residence in Washington. He had a very versatile genius, and especially excelled in acquiring languages. At Marseilles he passed for a Turk with a Turkish ambassador, who believed no foreigner could so perfectly speak his language; and at Washington he surprised a delegation of Cherokees by disputing with them in their own tongue. He wrote an answer to S. Cary's review of his first book; a letter to W. E. Channing regarding his two sermons on infidelity (1813); and a "Narrative of the Expedition to Dongola and Sennaar" (London, 1822), which was republished in the United States in 1823.

ENGLISH, Thomas Dunn, an American author, born in Philadelphia, Penn., June 29, 1819. He received the degree of M.D. from the university of Pennsylvania in 1839, and having subsequently studied law was admitted to the bar. He has written two novels entitled "Walter Woolfe" and "MDCCCXLII," and has edited and contributed to a variety of journals and magazines. In 1855 he published a collection of his miscellaneous poems. He now resides in the vicinity of New York, and is connected with the press of that city.

ENGLISH CHANNEL, that portion of the Atlantic which separates England from France, extending on the N. from Dover to the Land's End, and on the S. from Calais to the island of Ushant. At its W. end it is 100 m. wide; on the E., where it is united to the North sea by the strait of Dover, it is about 20 m. across, and its greatest width is about 140 m. The English coast of the channel is 390, and the French 570 m. in length. In it are the isle of Wight, Guernsey, Jersey, and other islands. A current appears to run through it from the W. On the English coast it has some excellent harbors, but those on the French side, excepting the artificial

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port of Cherbourg, are too shallow for men-of-war. Important pilchard, mackerel, and oyster fisheries are prosecuted in its waters. From its peculiar shape the French call it *la Manche*, "the sleeve."

ENGRAFTING, the process in horticulture by which varieties of one kind of plant may be induced to grow artificially upon other individual varieties or species. No attempts toward engrafting plants on others which do not belong to the same natural order have been successful. Generally speaking, varieties succeed best on varieties, species on species, or species and varieties on allied genera. All our cultivated fruits, for instance, are improved varieties of some original species, now not ascertained. Out of thousands of varieties raised from the seeds of some previous excellent variety, very few have any merit, the tendency being to return to the original specific type. When a new and decidedly valuable variety occurs, it becomes a matter of importance to perpetuate it in as great a number of individual plants as possible. The trifling effect that the stock has upon the scion enables the poorer varieties to be employed in furnishing the trunk and root to the smaller and younger scion. A piece of well-ripened wood, in the form of a twig having 3 or 4 buds upon it, is thus transferred to the poorer kind, and forms a living extremity, which extends itself into branches and forms a new head or top. In this way varieties of apples and of pears may be engrafted upon the wild crab, or upon paradise stocks; but the result is to dwarf and stint the growth of the freer-growing scion. Here, varieties are assisted by species; and *vice versa*, species, or varieties of one kind of species, may be propagated on those of another. The pear, too, in its almost endless varieties, may be engrafted upon the apple, quince, hawthorn, and mountain ash, where we see species and varieties of species flourishing upon entirely distinct genera. The stone fruits engraft with more difficulty, yet the varieties of the plum can be engrafted upon plum stocks or upon the apricot, the cherry upon cherry, &c. Nut-bearing trees are often engrafted to insure a better sort of nuts, and ornamental trees and shrubs of rare and curious kinds can be increased in the same way. The evergreen pines have been thus propagated, and so too have beeches and ashes, as well as the lilac upon a distinct species of lilac, and even the common lilac upon the ash. The rose acacia thrives finely upon the common locust, and forms a highly ornamental head in 2 or 3 years. Many choicer foreign shrubs and plants cultivated in greenhouses are thus profitably increased, of which the camellia is a notable example. The daphne, with fragrant blossoms, a favorite in the parlor, unites well with the *spurge* laurel of England; the oleander with double flowers unites with the single kind, and the succulent-stemmed cactuses and their allies can be engrafted upon each other. Remarkable stories are in common circulation of extraordinary instances of engrafting the fig tree upon the olive, the plum upon the pear, and the rose upon the black currant, and even of causing a great many kinds of flowering plants to grow upon a single and distinct stock; but all such are fallacies. In some countries plants are sold in the market places, so prepared as to deceive the unwary. A hollow-stemmed and woody kind is selected, and a variety of others are inserted; or their seeds are so sown as to enable their roots to descend into the hollow part, where they will meet with suitable soil and nourishment. In this way, the different kinds of leaves and flowers, being made to intermingle, serve to produce a strange and anomalous effect. Something of the same sort may be noticed in the chance springing up of currant bushes in the cracks and crevices of trees, and of the mountain ash in the rotten hollows of the large trees of our cities, the decaying wood and the dust swept by the winds into these cavities affording them a partial and limited support. In some other instances, the expansion of the leaves, and a feeble development of the engrafted scion upon another plant not kindred to it, seem for a while to show the possibility of such a union; but the effect is so transitory and the death of the branch is so certain, that such instances are no exception to the general rule.—A great variety of processes in engrafting are possible, but the principle of the operation is the same in all. In the vegetable kingdom, a distinct vitality, capable of development to an unlimited extent, is resident in every individual bud. In the growth of all exogenous plants there is a peculiar organization between the inner surface of the bark and the outer surface of the wood, which is called the alburnum. The vital power of the plant resides chiefly here. Thus the woody portions may be removed without affecting the life of the tree, or the bark may be stripped off without killing the tree, provided no injury is sustained by the alburnum. This vitalized organization renews the bark and the wood, so that its presence is essential. It is then equally essential that the alburnum of the scion, as it is termed, be brought into exact and close contact with the alburnum of the stock; thus the greatest amount of contact of the alburnum in both will insure the most perfect success.—In this country, the most common and likewise the most clumsy, and yet quite as often the most successful plan of engrafting, is called CLEFT GRAFTING, and is practised upon the heads of large or old trees by lopping the extremities of the branches. Sometimes the entire tree of 4 or 5 inches diameter is cut to a bare stock and used in the same manner. The stock, whether trunk or branch, is cut over horizontally with a sharp saw, and the surface pared smooth with a knife; a cleft about 2 inches deep is made in the stock with a splitting knife and hammer; the scion to be engrafted is prepared by sloping its lower end in the form of a wedge about an inch and a half long, leaving it a little thicker

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on the outer edge. The cleft being kept open with a wedge, the scion is carefully pushed down to the place fitting its inner bark on one side, so that the inner edges of stock and scion may coincide. The wedge is then withdrawn, and the scions are retained in place by the springing together of the cleft, when the graft is covered with some kind of composition, either of clay or of wax, in order to exclude the air and to facilitate the union.—In England and on the continent, another process, called WHIP or TONGUE GRAFTING, is mostly employed. This is considered the most expeditious. The stock upon which it is performed must be slender, from the size of a goose quill to any diameter which coincides with the thickness of the graft. Some smooth, clear part of the stock being selected, it is in heading it off sloped on one side with a knife to a very acute angle, and a slit made on the lower side of the slope to receive the wedge or tongue of the graft. A scion having 4 or 5 buds, and of the size to match the stock, should be sloped at the bottom so as to accurately fit it. The rinds of both should be made to correspond; a string of soft bast should be wound round them to hold them in place, both covered with the grafting composition. After the graft pushes its buds, the binding should be loosened and finally removed, when the adhesion is completed. Pieces of the roots of apple, quince, or pear are also whip-grafted and planted out, just exposing the top of the scion to the air; these unite firmly and make vigorous plants. This may be practised also on flowering shrubs.—IN SADDLE GRAFTING, the scion is cleft instead of the stock; the stock is pared away on each side to an acute angle, so as to allow the scion to sit or ride upon it, and the union of the edges of the barks made as complete as possible on each side.—CROWN GRAFTING is practised upon large trees of which the wood is too hard and stubborn to be cleft. Several scions are pared away on one side of the lower end for about 2 inches, so as to make that side flat and leave a shoulder forming a right angle with it. The head of the stock being sawn off horizontally, the bark is gently raised from the wood and thin wedges inserted. The scions are now pushed under the bark, their shoulders resting on the crown of the stock; the wedges being withdrawn, the whole are tied in by soft bast or other string, and composition of wax or clay laid over, to prevent any wet penetrating the wounds. After the grafts have grown, and made long, tender shoots, which they will be apt to do with much rapidity and vigor, they should be secured to long stakes planted near the stock and rising above it, so as to save the newly formed top from breaking off at the junction with the stock, by the force of winds acting upon the luxuriant foliage.—Sometimes it is essential to replace limbs that have been broken from young trees, or from branches of older ones, and to restore the symmetry of form; and this is done by SIDE GRAFTING. Here the bark and a little of the wood is sloped off from the side of the trunk or of the branch, and the lower end of the scion is cut so as to fit the part as near as possible; it is then fixed in the branch or trunk, first tonguing both as in whip-grafting, tying them with bast, and claying over.—INARCHING is only a kind of engrafting, and is employed where the cut scion is not to be easily united to the desired stock. Two branches, or two stocks of the two distinct plants, are brought close together, and, the prepared surfaces being matched and tongued, the whip-grafting is employed; after a while a perfect union will have taken place, when the engrafted portion is to be separated from its parent root, and it henceforth becomes the branch or top of its new foster mother.—BUDDING (which see) is only a variety of this art.—The practice of engrafting seems to have been long known; but the processes have multiplied with the discoveries and improvements in horticulture.

ENGRAVING, properly the art of cutting designs upon hard surfaces, as of wood, stone, or metal—a species of sculpture upon plane surfaces. In this sense the art was practised at very remote periods, mention being made of the work of the engraver in Exodus xxxv. 35. In its modern use the term more commonly designates the production of designs by cutting or by corrosion upon the face of blocks or metallic sheets, which are to be used for transferring the figures by pressure to paper or other soft substances, in order to multiply copies. Engraved plates serve therefore a similar purpose to moulded types used for printing; but the art of preparing the plates is of much higher order than the manufacture of types or the setting of them to form a page. For types are only fixed, arbitrary symbols, which have no expression of their own; while engravings are pictures, from originals drawn it may be by masters in painting or design, which cannot be transferred line by line to a new surface, even with the aid of ingenious mechanical devices, unless the copier can enter somewhat into the spirit of the artist, and thus catch the expression of the work. The relation of the engraver to the painter, as remarked by Allan Cunningham, is that of the translator to the author. By means of the art the masterpieces of sculpture and painting are placed, in faithful copies, within the reach of all; science is made familiar by cheap illustrations, that reach the understanding where words fail; instruction and amusement are presented by it in wonderful variety in the constant succession of cheap ephemeral productions which are a peculiarity of this age; and monetary transactions are facilitated by the unlimited number of facsimiles of intricate designs, furnished at trifling cost for a single copy, but difficult and expensive to counterfeit. The period when engraved plates or blocks were first printed from is involved in much obscurity. The Greeks are said by Herodotus to have prepared maps upon metallic plates (500 B. C.), which might very well have served for furnishing copies by impression, but were probably never applied

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to this use. The Chinese are said by Du Halde to have practised the art 1120 years before Christ, and some suppose that from them the art was transferred to Europe. It is first mentioned as having been practised by an Italian family of the name of Cunio, who executed wood engravings in the year 1285, and who may have received the art through Venetian merchants. Such is the opinion of Ottley, the author of the "History of Engraving." A decree of the magistracy of Venice of 1441 has been brought to light, in which it is stated that the art and mystery of making cards and painted figures had fallen to decay, owing to their extensive importation, and the introduction into the city of such work printed and painted on cloth or paper, as altarpieces or images and playing cards, was in consequence prohibited. This indicates the existence of the art not only in Venice but in other places also at that time, and for an unknown period previously. Playing cards, it is known, were in use in 1275, and it was probably for multiplying copies of their simple devices that impressions were first taken from engraved blocks of wood. In the beginning of the 15th century this was an established trade in Germany, the artists being known as *Briefmaler*, and also as *Formschneider*, or figure cutters. They applied their pursuit to higher objects also, and engraved prints of saints, and even impressed some rude forms of books upon sacred subjects, the printed matter occupying only one side of a large page, and two of these being pasted together. One of the earliest remaining of these wooden cuts, bearing the date of 1423, is of folio size, and preserved in a convent at Buxheim, near Memmingen. Its subject is "St. Christopher carrying the Infant Jesus over the Sea;" and its illuminations are of the style of those on the playing cards. It is now in the possession of Earl Spencer, in England. A specimen of these illustrated books was called *Biblia Pauperum*, "Bible of the Poor." The editions vary from 40 to 50 leaves, small folio, printed on one side only of the paper. From these rude beginnings it was a short step to the invention of movable types and the discovery of the art of printing. Copper was very soon employed as well as wood for engraving upon, and at about the same time in Germany and in Italy. A German copperplate print is in existence of the date 1461, and it is unlikely that this was the oldest specimen. But Vasari gives the credit of the earliest use of this metal to Finiguerra, a native of Florence, who practised, in his occupation as a goldsmith, the engraving of plate for churches, &c., by running into lines cut in the metal a black-colored alloy of silver, lead, copper, sulphur, and borax, called *niello*. The surface being polished, it was thus beautifully ornamented according to the skill and taste exhibited in the pattern. It was for the purpose of obtaining a copy of the engraved figure that Finiguerra is said to have made an application of soot and oil, and taken an impression on damp paper; and thus was made the first representation on paper from a metallic plate. The art was at once taken up and extensively practised. Painters of distinction, as Botticelli, gave their attention to it, and it was rapidly perfected. This was especially the case in Germany and the Netherlands, great numbers of eminent men adopting the art, among whom Albert Dürer is particularly distinguished. Rembrandt, Vandyke, and other great painters, also executed valuable works of art with the etching needle, and Raphael highly prized the services of the great Italian engraver Marc Antonio, who transferred to copper many of his designs. The art appears to have been introduced into England at an early period, an illustrated work called the "Golden Legend" having appeared in 1483, and in 1545 was published Vesalius's "Anatomy," in Latin, illustrated with copperplate engravings. Maps of English counties were engraved in 1579. Little progress, however, was made previous to the 18th century, when Vertue and Hogarth, and subsequently Strange, Woollett, Bartolozzi, Sharp, and others, brought the art to a high degree of excellence. At present engraving on wood or metal is more extensively practised than ever, owing chiefly to the demand for prints for the embellishment of books or illustrated periodicals. Italy is no longer preëminent for her engravers; she has however within the century furnished some engravers of transcendent merit, whose works will compare with the best of their predecessors. At the head of these stands Raphael Morghen, whose "Last Supper" after Da Vinci, "Transfiguration" and *Madonna della Seggiola* after Raphael, are among the most costly productions of the art. Schiavoni, the Anderloni, Bettelini, Longhi, Porporati, Pavon, the latter a scholar of Raphael Morghen, and others, have engraved with success many of the works of the old masters. Toschi, who died in 1854, took high rank among line engravers by his print of the "Entry of Henry IV. into Paris," after the picture by Gérard, as well as by his "Descent from the Cross," after Volterra, *Spasimo di Sicilia*, after Raphael, and other works from the old masters. Rosaspina, Bisi, Mercuri, and others, have produced meritorious prints from masters both old and modern. In Germany the art has witnessed a steady improvement since the commencement of the century, particularly within the last quarter of it, although engraving on wood or stone is probably more extensively practised than line engraving or the other methods of working on metal. Rahl, Hess, Reindel, Umer, Leybold, Kessler, Kobell, Barth, Klein, J. H. and J. J. Lips, Steinla, and others, have gained eminence as line engravers; and Christian Friedrich von Müller, who died in 1816, aged 33, produced a print from Raphael's *Madonna di San Sisto*, which is regarded as one of the noblest achievements of the graver. His father, J. G. von Müller, was also a good engraver, and among other works executed the well known print of the battle of Bunker hill from Trumbull's picture.

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The *renaissance* in German painting, effected by the efforts of Cornelius, Overbeck, Schadow, Kaulbach, and others, has had a marked influence upon the art of engraving, and within the last 40 years a school of engravers has sprung into existence who have coöperated with these masters in their endeavors to restore to art its ancient simplicity and deep religious feeling. Prominent among these are Ruscheweyh, who was associated at Rome with Cornelius and Overbeck, and who has engraved the chief works of the new school; Amsler, Keller, the Felsings, and Merz, who have drawn their inspiration from the same source; Thaeter, Eichens, Mandel, Rahn, and Schleich, who, among other works, have engraved some of the masterpieces of Kaulbach, Schnorr, Scheffer, &c. In France as in Germany the efforts of engravers are now less directed to the reproduction of the works of the old masters, or of indifferent designs for illustrated books, than to the execution of prints after contemporaneous painters. David, Gros, Ingres, and others, have afforded numerous subjects; and of such popular painters as Vernet, Delaroche, and Ary Scheffer, probably nearly every important work has been engraved. France has, however, produced some excellent line engravers after the old masters, among whom may be mentioned the baron Desnoyers, who died in 1857, and who executed fine prints of Raphael's *Belle jardinière* and "Transfiguration," and of Gérard's Napoleon; Prévost, who has engraved Paul Veronese's "Marriage of Cana;" the Massards, Leconte, Lorichon, Bein, Richomme, Forster, Martinet, Lignon, Gudin, Audouin, Bridoux, Girard, &c. Of those who have devoted themselves to the works of modern masters, the most eminent perhaps is Henriquel-Dupont, whose line engraving of Delaroche's fresco in the hemicycle of the *Palais des beaux arts* is unsurpassed in merit or dimensions by any recent work of the kind. Blanchard, Prudhomme, Louis, and the brothers François, have engraved many of the works of Vernet, Delaroche, and Scheffer, and C. R. J. François has confined himself exclusively to Delaroche's works. Girardet has engraved from the above masters, and also several subjects from American history, including Leutze's "Washington Crossing the Delaware," Stuart's portrait of Washington, &c. Jazet is celebrated for his aquatints from the battle pieces of Gros and Vernet, and Calamatta has executed admirable portrait prints of Lamennais, Guizot, Fourier, and Madame Dudevant. Calame, a Swiss artist, has produced many admirable etchings. The practice of copying the old masters, and to a considerable extent of line engraving, has fallen into disuse in England, the latter being employed principally in large landscapes or in the higher class of figure pieces. Here again, as in Germany and France, the works of a few eminent native artists have occupied the attention of the chief engravers almost exclusively, and under the influence of painters like Reynolds, Lawrence, Wilkie, Turner, and Landseer, the art has been prosecuted with great success. Raimbach, Stewart, Burnet, Smith, and others, have made Wilkie's pictures generally known through the medium of excellent line engravings; and Goodall, Willmore, Pye, Wilson, Prior, Finden, Wallis, and Cousen have done the same for the landscapes of Turner, Stanfield, Constable, Callcott, Roberts, and the other great English masters of this department of painting. Martin's mezzotints of the "Fall of Babylon," "Belshazzar's Feast," &c., after his own designs, are striking works and well known. The engraving of Sir Edwin Landseer's works, of which nearly 200 different prints have appeared, has employed a numerous band of engravers, prominent among whom are the artist's brother Thomas Landseer, Cousins, Lucas, Bromley, Ryall, Atkinson, Baker, Wass, Gibbon, Graves, Bacon, and Robinson. Doo, Watt, Heath, Hollaway, who engraved the cartoons of Raphael in Hampton court, and others, have produced good line engravings from the old masters; and the more modern English painters, such as Leslie, Newton, Eastlake, Etty, Ward, Webster, Maclise, Millais, Frank Stone, Herring, T. Faed, &c., have found ready interpreters in Richardson, Bellin, Sadd, Howison, Walker, Simmons, Stocks, Reynolds, J. Faed, Hall, and many others. The etchings of George Cruikshank from his own designs are also of the highest order of merit. Wood engraving in Europe, and particularly in England, has reached a perfection unknown to any previous era in the history of art, and in the latter country the woodcuts of the Dalziel brothers, Evans, Cooper, Palmer, Linton, and others, have a richness and delicacy of finish not inferior to the highest efforts of the engravers on metal. In the Netherlands the principal engravers are Vinkeles and Van Genus, Van Trostwyck, Van Os, Overbeck, Janson, Chalon, Claessens, De Frey, Corr, &c. In the United States, where the art has been pursued principally for the production of vignettes for bank notes or small prints for books, the most eminent names are Durand, Cheney, Smillie, Danforth, Sartain, Dick, &c.—According to the material used for receiving the designs, the art is designated as xylography, chalcography, siderography, and lithography—from *ξυλον, wood, χαλκος*, copper, *σιδηρος*, steel, *λιθος*, stone, and *γραφω*, to inscribe. The last will be treated under its own designation.—XYLOGRAPHY, or WOOD ENGRAVING, is the simplest and cheapest form. The woods used are those of the box, pear, and occasionally the apple and beech trees, also for large placards mahogany and pine. The first named is decidedly the best. It is close and even grained, hard, and tough, and not liable to be attacked by insects. It should be selected for its uniform yellow color, which implies uniformity of texture, and before using must be thoroughly seasoned. The drawing is made with a lead pencil upon the surface, which is cut across the ends of the fibre of the wood and smoothly planed; then with a slender and finely pointed graver,

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called the outline tool, the boundary lines of the portions to be removed are slightly cut in the wood, which are to form the light parts of the engraving. The lines marked in the drawing are the prominent parts, which are to receive and transfer to the paper the ink or other coloring matter; in copperplate engraving the lines are sunk into the metal. There is a method of wood engraving in which the ground is inked, and the lines sunk in the block appear white upon the paper, thus producing a good effect for outline sketches at little cost. This, however, differs from copperplate engraving in the ground instead of the lines receiving the ink. The outlines being cut into the wood, the portions to be removed are next cut out by means of gravers and gouges of different sizes. The blocks of small woodcuts are so shaped as to be inserted in the page with the types, their surface being brought to the same level, and the printing is then effected precisely as if the whole were types. In the same manner they are blocked in stereotype plates. The thickness of the blocks of wood is the height of common types. An application of flake white or bath brick and gum water is made upon the surface of the wood in order to receive the lines of the drawing. *Chiaroscuro*, or *claro obscuro*, is a method of wood engraving in which a series of blocks are used, the first having merely the outlines of the print, the second only the less dark shadows, and the third those more dark, and so on if more are used. An impression is taken from each in succession. In some instances a copper plate is used to give the outlines in a heavy, dark style. It is on this principle the printing of colored engravings is effected, a series of blocks being employed, each one having its own color and being used in turn, as practised in CALICO PRINTING, which see in this work, vol. iv. p. 224.—COPPERPLATE ENGRAVING is practised by various methods, the most simple of which is to cut in the lines of the drawing with sharply-pointed gravers, after the sketch has been transferred to a thin covering of white wax melted uniformly over the face of the hammered and polished metal. The transfer is effected by laying a tracing of the design in black lead pencil face down upon the wax and subjecting it to a heavy pressure. The lines are then distinctly seen upon the wax when the tracing paper is removed. By the use of very delicate gravers the lines are slightly marked through upon the copper, and when the wax has been melted off the engraving is completed by cutting the lines to the proper depths with suitable gravers, removing the burr which is pushed up by the graver with another instrument called a scraper, and softening the effect produced by scratches and lines cut too deeply into the metal by rubbing the surface over with the smoothly-pointed steel instrument called the burnisher. The graver or burin is similar to those used in wood engraving. The point is of pyramidal form, with unequal sides, and is kept sharp by frequent application upon an oil stone. The handle is short, and the side on the line with the point is made flat, both for the purpose of applying the instrument at the smallest angle with the flat surface, and to cause it to remain without rolling wherever it is laid down. In use, the point is thrust forward, cutting a furrow in the metal and raising burrs by the sides of the lines. These are commonly taken off with the scraper, but in some instances those made with the finest etching needle, called the dry point, have been allowed to remain, and a pleasing effect is said to have been produced in many of Rembrandt's engravings thus treated. The polish and cleanliness of the plate are preserved by frequent rubbing with a woollen rubber wetted with olive oil. Parallel lines required in series are cut by a ruling machine. The fainter shades too delicate for the gravers are scratched in with the needle or dry point, which is held in the same way as a pencil in drawing. Such is the simplest method of line engraving on metallic plates.—Engraving by dots or punctures made in the metal to produce shades is often practised, but commonly in the etching process. The dotted style is called stippling. The effect is produced by dots made usually in curved lines with the graver, the point, or by etching; the more closely the dots are grouped together, the darker the shade. The style was much practised by the English in the latter part of the last century, and is particularly adapted for giving a soft pleasing effect in shading the limbs of the human figure, in representing flowers, &c. The work resembles painting more than line engraving. For producing the greatest delicacy in shading, the fine dry point is used. When the dots are struck in with a little hammer, the work is called *opus mallei*.—The most common method of engraving upon copper, practised also upon other metals and upon glass, is that called etching. It consists in causing an acid to bite in the lines, which have been drawn through the coating of wax, called the etching ground, upon which the acid has no effect. Albert Dürer is supposed to have invented the method, the earliest known specimens of it being among his works. The etching ground is prepared by melting in a crucible at a moderate heat 2 onnces of white wax, with half an ounce of black pitch and the same of Burgundy pitch, and stirring in 2 ounces of asphaltum in powder. When thoroughly incorporated by boiling, the mixture is poured into water. It is then separated and worked by hand into balls, which are tied up in pieces of smooth-worn silk. The application upon the plate, uniformly heated, is made by rubbing one of these balls over its surface, so that the composition melts through the silk. It is then spread evenly over the copper by a dauber, which is a bag tightly filled with soft wool and covered with smooth silk. The ground being thus evenly spread, the plate is next held over several smoking candles, till a coating of lampblack covers the wax. The outline of the design, made with black lead pencil upon paper,

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is then laid face down upon the lampblack, and by pressure between the rollers used for this purpose it is transferred to the etching ground. Sometimes the back of the sketch, which in this case is drawn reversed, is covered with whiting, and laid upon the blackened surface, and the lines then being gone over with a blunt point, they are transferred by the chalk adhering to the lampblack and wax. The lines are then drawn with etching needles through the ground to the copper, the same care being taken to preserve the proper effect of distance, by appropriate fineness or coarseness of the lines, as in a finished drawing. In order to retain the acid upon the plate, a ridge of what is called banking wax is laid around its edge about half an inch high. This is prepared by melting together two parts of pitch and one of beeswax, and adding some sweet oil. Nitric acid diluted with about 4 parts of water is then poured over the plate, and allowed to remain long enough to corrode the fainter portions of the sketch. It is then poured off, and the plate is washed with water. When dry, an application of a mixture of lampblack and Venice turpentine, called stopping ground, is made with a camel's hair brush to these portions, by which further action of the acid is prevented. By a renewed exposure to the acid the parts not protected are more deeply corroded, and a correspondingly bolder shade will be imparted to these lines. Another application of the stopping ground gives another gradation of tint, and as many of these may be obtained as the times of repeating the process. The border of wax is then melted off, and afterward the etching ground is so softened by heat that it is wiped off with a rag moistened with olive oil. Portions of the plate that require it are then gone over with gravers, and the finishing touches are thus put on. It is often the case that a part of the work is done wholly by the graver after the other portions have been etched. The shades are frequently produced in the stippling style both by etching and afterward in finishing by striking in the dots. It is apparent from this description that the art of engraving can be practised only by good draughtsmen; and that as clear ideas are requisite of the different grades of the shading and of the methods of producing these effects, as if the sketches were to be produced for the first time upon paper.—The styles of engraving known as *aqua tinta* and *mezzotinto* require notice. The former is so named from the similarity of the effect to water-color or Indian ink drawings. After the design is etched in outline, and the etching ground removed, a solution of resin or of Burgundy pitch in alcohol is poured over the plate as it lies in an inclined position. As the alcohol evaporates, the resinous matter is left in the form of granulations over the surface of the plate. The design is then drawn with a gummy sirup called the bursting ground, which is applied wherever a shade is to be produced. The lights are left untouched. The whole is next covered with a coating of turpentine varnish, and a border of wax is raised around the plate. Water is poured upon it and left for 15 minutes, when the bursting ground cracks open, exposing the copper. It is then ready for the nitric acid, which is used as in etching, and may be several times applied after each stopping out of the portions sufficiently corroded to produce the desired shades. The bursting ground is not always required, the acid being applied directly upon the granulations, which protect the parts they cover, and the varying shades are produced by repeated corrosions and as many stoppings out. By some artists certain resinous powders are dusted upon the plate instead of obtaining the granulations by the alcoholic solution. Gum sandarac is used for this purpose, or the purest resin more or less finely pulverized, and sifted through muslin upon the plate, to which the particles attach themselves on its being heated. Colors are sometimes applied to the plates, and the design is at once printed in its intended colors; but where several colors are employed in contact with each other, it has been customary to use as many different plates, one for each color, and print in succession, the plates being kept in their exact places by fitting upon 4 fixed pins that pass through holes in their corners. This method is practised in engraving upon cotton cloth. (See Calico Printing.) The aquatinta process is a French invention, dating from 1662. It has been a favorite style of engraving with English artists, whose works by this method are of the highest merit. The same remark may also be made of the mezzotinto or half-painted style, which was introduced into England by Prince Rupert, who may have invented the process, or possibly learned it, as some say, from an officer named Ludwig von Siegan, who was in the service of the landgrave of Hesse. The invention has also been credited to Sir Christopher Wren. The method is particularly appropriate to portrait and historical engravings and night scenes requiring a very dark ground. The preparation of the plates is a mechanical work, performed by running little toothed wheels set in handles over their whole surface, and by a rocking motion causing them to make indentations and raise corresponding burrs or barbs in lines variously directed. These instruments are called cradles. They are made of various degrees of fineness, and the difficulty of the process is in the skilful adaptation of the proper shades in the ground produced by these tools. After the whole plate has been thus covered, the burrs are rubbed off with scrapers and burnishers wherever lights are desired, and deeper shades are made, if necessary, by increasing some of the indentations. The lights and shades are thus brought out, and an agreeable softness is produced by the harmonious gradations of the tints more easily than by the other methods of engraving. The plates do not wear very well in printing unless steel is substituted for copper. By combining etching of the outlines with the mezzotinto the process is much improved, and a more decided character is given to the prints. Mezzotint plates are now sold

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for the trade supply, which are prepared by a machine invented by Saulnier for ruling lines. The cross ruling is sometimes so fine that the ground appears black.—ENGRAVING ON STEEL may be regarded as an American process, invented by Mr. Jacob Perkins, of Newburyport, Mass., though the metal had once been used in England in 1805 in the print of the ceiling of the star chamber in Smith's "Topographical Illustrations of Westminster." Its great advantage consists in this—that the plates, after having been engraved by the methods used for engraving copper, can be hardened, so that they are capable of transferring the design by pressure upon other softened plates of steel; and these, being hardened, may perform the same office upon others, and so an indefinite number of plates may be obtained from one engraved. This is peculiarly the invention of Mr. Perkins, and its most important application is for engraving bank notes, for which the most expensive designs are desirable in order to prevent counterfeiting. This branch of the art is especially treated below. The design being once engraved upon a steel plate, any number of copies may be produced from it. Perkins prepared his plates by first transferring the impression from the original plate to the surface of a soft steel cylinder by repeatedly rolling this under heavy pressure over the hardened plate. The cylinder receives the impression in relief, but being hardened, it transfers it to successive soft plates like the original. Unless an immense number of impressions is required, a soft steel plate is sufficiently hard without subjecting it to any further process, and for the most delicate works of art in this metal this is preferable, as in the transfer there is always some risk of injury. A soft plate has furnished as many as 95,000 impressions without deterioration. The hardening is effectually accomplished by dipping the plate, in order to heat it, in a bath of melted fusible alloy, and then cooling in water, which it is perhaps better to heat to the boiling point. In preparing the soft plate for etching, the lines should be cut into the steel, as the acid would be likely to corrode a broad instead of a deep line. In the ruling machine of Mr. William Lowry a diamond point is sometimes employed for cutting the lines.—Stones are often engraved, a dry point being used as in engraving metals. The work does not produce so fine effect as engraving upon metal, but it is well adapted for mechanical drawings, maps, and similar styles. Glass may be engraved by sketching the design upon it with a solution of beeswax and turpentine, and then causing the surface to be corroded by the fumes of hydrofluoric acid generated by the action of sulphuric acid upon pounded fluor spar, which is placed in a shallow basin of lead and gently heated. Or the glass may be covered with a thin layer of beeswax, through which the design is etched, and this is then subjected to the action of the vapor, as the plate is laid face down upon the basin. The corrosion is completed in 4 or 5 hours, when the applications should be removed, and the glass cleaned with oil of turpentine. The process is conveniently applied to the marking of bottles for the chemist or apothecary. The deep transparent etching is produced by the direct application of the liquid acid to the glass; the more delicate opaque lines by the vapor. (See FLUORINE.)—In order to lessen the tedious mechanical operations connected with engraving, attempts have been made to obtain directly by chemical means from the drawings engraved daguerreotypes for printing. The investigations of Mr. George Mathiot of the U. S. coast survey in this direction particularly demand notice. They were prosecuted with the object of applying the process to the printing of the maps of the survey; and though the method is not claimed to be altogether original with him, it has been by no one else so perfected and practically applied. The subject is treated in detail in the "Report of the U. S. Coast Survey for 1854." In a daguerreotype the light and dark shades are chemically different, and hence are differently susceptible to the same chemical reagent. M. Donné proposed to etch the plate with nitric acid, which he inferred would act upon the dark shades, supposed to be silver, and leave the lights, which are mercury. This has not been found successful. Prof. Grove proposed etching the daguerreotype plate by the voltaic current, making it the positive electrode in a bath of strong hydrochloric acid. Mr. Mathiot succeeded in obtaining engravings of great beauty and delicacy by this method, but in only two instances in more than 100 trials were the lines deep enough to print from. The most satisfactory results were obtained by the use of a carefully prepared copper plate, upon which was deposited a film of silver of about $\frac{1}{4}$ of a grain to the square inch. On this, after being washed in distilled water, dried and slightly buffed, the daguerreotype is taken. It is then submitted to the action of the voltaic current in a bath of chloride of sodium, until the silver is etched through to the copper, at which the action stops; but unless the plate be immediately removed from the bath, the lines will spread in the silver film and blur the effect. The time to remove the plate is determined only by practice and dexterity. After removal the plate is washed by immersing it in water; and it is then dried over a current of heated air. If no imperfections are detected on examination, it may next be submitted to the action of a reagent, which will etch the copper on the exposed lines without affecting the silver. Solutions of perchloride of iron, persulphate of iron, and nitrate of silver are found suitable for this purpose. The first is perhaps preferable, though it is more apt to corrode the lights than the last. The objection to this is its tendency to fill up the fine lines by deposition of metallic silver. The aqueous solution of the perchloride should be of the strength repre-

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sented by a lemon-yellow color. "The plate is to be immersed in a horizontal position, with the face up in the solvent, and a soft camel's hair pencil swept gently over it from time to time. In the course of 30 minutes or less, the action of the perchloride will have thown up chloride of silver, so that the brush can sweep it away, and the light copper will appear in the bottoms of the lines. The plate may then be washed and dried, and if on inspection it should not be thought deep enough to hold the ink for printing, it may be returned to the bath of perchloride for a short time." The difficulty in the process has been to obtain sufficient depth in the lines without corroding the lights; and the maps consequently, though exact copies, lacked force of expression. The engraver, however, can soon remedy this by going over the lines upon the plate with the burin, and thus giving them the reqnired depth. The film of silver over the copper is necessarily very thin in order that the first etching may reach through it, and yet it must be sufficiently thick to afford complete protection to the copper it is designed to cover. It has been a nice matter, thus restricted in both directions, to determine exactly the right thickness. In answer to some questions raised respecting the tendency of the biting agent to work laterally and produce rongh and uneven lines, Mr. Mathiot presented a communication to "Humphrey's Photographic Journal," Nov. 15, 1855, in which he advances the opinion, based upon his experiments, that it is not the film of mercury which protects the light shades from the action of the reagents which corrode the darker parts; bnt that in the lights of the pictnre a crystallization of the silver has taken place, and this has extended within the metal in proportion to the intensity and duration of the light. The action appears to be directly due to the mercury, and the effect is to protect the metal in proportion as this crystallization has taken place, not merely at the surface, as it would be protected by a film, but also in the substance of the metal; so that the lines made by etching a daguerreotype do not spread at the bottom. On the contrary, from the crystallization spreading in the interior under the shaded portions, the lines become narrower as they grow deeper. In the "Coast Survey Reports" of 1855 and 1857 are accounts of the extraordinary improvements of Mr. Mathiot in the application of the electrotype to the engraving of charts. In the former year he devised a method of joining together detached plates to make a single large one, without incurring the tedious and somewhat hazardous operation of fitting the thick plates by sawing or filing their edges to the required shape. Instead of this he took thin electrotype casts of the detached plates, trimmed these with scissors to fit each other, and cemented them with shoemaker's wax upon a blank plate; the wax in excess he wiped off with a cloth saturated with oil of turpentine. The plate is then ready for the electrotypist. By this method work which required weeks of mechanical labor is completed in as many hours by the artist himself, and no risk is incurred of injuring the plates. Large maps also can be rapidly engraved by dividing the work among many engravers, and taking separate electrotype casts of each piece to be afterward united in one. In the report of 1857, printed in 1859, the extraordinary progress in this department is more particularly noticed, and the fruits are seen in the great number of beautifully engraved charts which accompany the report. A new plate is prepared on an average in every 2½ working days, when a few years ago it was thought an achievement to produce 6 in a year. Thin electrotypes serve even to print from, being made sufficiently stiff by stretching them on smooth steel plates, called stretch-plates—each one serving for all electrotypes of its size. Mr. Mathiot proposes this application to all kinds of printing done from engraved surfaces other than warped surfaces. Mr. Mathiot reports as follows: "The working of the thin electrotypes has suggested to me the idea of using these plates on a circular bed or roller, and gaining thereby the great advantages of cylinder printing for flat plates. This has often been sought before, bnt the impossibility of getting a rigid plate to conform accurately to a cylindrical figure has hitherto defeated it. As the thin electrotypes are easily strained over a curved surface, the great desideratum is now attainable. I am about having this matter put to a practical test, and have every hope that the copperplate printing can thus be executed by steam machinery, and with almost the rapidity of letterpress work."—As applied to stone, the art is now known as photo-lithography, and maps thus prepared were first published in the 1st volume of Palfrey's "History of New England" (Boston, 1859); and others in the same style were next seen in Lesley's "Iron Manufacturer's Guide" (New York, 1859). For an account of the process see LITHOGRAPHY. Applied to wood, the art is called xylo-photography. By one of the various methods proposed, the block is covered from the light of day with a mixture of oxalate of silver, water, and a little gum. This is rnbbed with the finger till the moistnre nearly disappears, and a delicate coating of the silver salt is evenly spread upon the wood. The block is then put away in the dark for any length of time; and when wanted, it is ready to receive the picture by the usual photographic process as applied to prepared paper. This being done, the block may be immediately engraved, just as if the picture had been transferred by ordinary methods, except that it should not be exposed to the direct rays of the sun, nor so long as several hours to diffnsed daylight. The chief difficnlty experienced in these transfers is the liability of the chemically prepared surface to flake off on tonching the block with the graver. In the *Comptes rendus*, Oct. 1857, is a description of another process in which the wood is coated with alum, gelatine, and animal soap, then exposed to a solntion of

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sal ammoniac, and after this to one of nitrate of silver. The picture is transferred from another on glass or paper, and is fixed by a saturated solution of hyposulphate of soda. The following process was devised in Worcester, Mass.: A preparation is applied to the blocks of asphaltum dissolved in ether, as M. Niepc de St. Victor used the same in photo-lithographing. This is followed by an application of lampblack. The surface is then polished with a smooth cushion, till it becomes of glossy jet black, when it is coated with collodion and rendered sensitive by nitrate of silver. It is then ready for the camera. Herr Pretsch in 1856 devised a new method applicable to copperplate engraving, in which the electrotype process was applied to succeed the photographing. He exposes a glass or metallic plate, coated with a mixture of glue, bichromate of potash, nitrate of silver, and iodine of potassium, to the copying process with the design to be transferred. A faint picture is produced upon the prepared surface. After washing, the picture comes out in relief by the swelling of the film. It is then subjected to other processes, which raise it still more and increase its hardness. It may then be made to receive by the electrotype operation a coating of copper; or it may first be transferred by pressure to a warm sheet of gutta percha, and this be subjected to the copper solution in the battery. This process excited great expectations, and in England a company was formed to engage in the operation upon a large scale. It did not, however, prove a profitable undertaking. Another invention, called photo-glyphic engraving, has recently been patented in England by Mr. Fox Talbot, distinguished for his early researches and discoveries in photography. It is applicable to plates of steel, copper, or zinc. He obtains upon the plate a faint image of the object to be copied by the process patented by him in 1852, using a coating of glue and bichromate of potash. But he avoids the subsequent washing then employed. Instead of this he covers the plate evenly with a thin coating of finely powdered gum copal, and melts it over a spirit lamp, thus producing a uniform aquatint ground, ready for etching. A small quantity of saturated solution of perchloride of iron, with the addition of about ½ its quantity of water, is poured on the plate and spread with a camel's hair brush. This liquid penetrates the gelatine only where the light has not acted on it. In about a minute the etching is seen to begin, which is known by the parts etched turning brown or black, and then it spreads over the whole plate, completing the operation in all the details of the picture in 2 or 3 minutes. The action is assisted by stirring the liquid all the time with the brush, and thus gently rubbing the gelatine. To deepen any portions, the brush may afterward be applied with fresh liquid, but prepared of equal parts water and saturated solution of the iron salt. The weak solution is said to act more rapidly than the stronger.—

Bank Note Engraving. To the efforts of artists and mechanics in the various processes of manufacturing bank notes the art of engraving owes some of its most important developments. In the United States this branch has attained its greatest perfection, and whatever skill has in England been shown in bank note engraving has been the result of improvements introduced directly from this country. The rude and cheap notes, roughly engraved, such as were used by the bank of England a century and a half ago, were reproduced unaltered for at least 100 years, at the expiration of which it was found necessary to effect some improvement because of the frequent forgeries detected about that time. In the year 1800 the directors of the bank of England first endeavored to furnish notes which should be secure from counterfeits, but this attempt failed. Forgeries multiplied, and it was not until 1820, two years after a committee had been appointed by the society for the encouragement of arts, and commissioners had been appointed by the English government for the purpose, that any positive improvement was made in the style of engraving bank notes. In America, however, a superior system had for some years existed. The continental notes, the earliest in this country, engraved by Harrison, were of no importance as works of art, and those next engraved for the bank of North America, by the Philadelphia firm of Murray, Draper, and Fairman, were little better; but the invention of steel plate engraving and the transferring process by Mr. Jacob Perkins, described in a previous part of this article, at once raised bank note engraving to the rank of a special art. Mr. Perkins's reputation as a manufacturer of bank note plates became so great that in 1808 a peculiar style of note with stereotype check, invented by him, was by a special law of Massachusetts directed to be used for all the banks of the commonwealth. This "stereotype check plate," although a sufficiently thorough protection against counterfeiting at the time of its adoption, grew so familiar in the course of 20 years that fraudulent imitations became numerous, and the law was ultimately repealed. Some New England banks continue to use it to this day, notwithstanding the inelegance of its appearance compared with what more modern engravers have accomplished. About 1814 Mr. Perkins went to Philadelphia, and became associated with the firm of Murray, Draper, and Fairman, with whom he remained several years, still perfecting his machinery. He left behind the original transfer press constructed by him, which is still at Newburyport, though long ago discarded as too clumsy and complicated for use. The first piece of steel on which transferring experiments were made by him is retained in the Boston office of the "American Bank Note Company" as an interesting relic. While Mr. Perkins was in Philadelphia, Asa Spencer, also connected with Murray, Draper, and Fairman, succeeded in applying the mechanism of lathe work to bank notes, thereby secur-

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ing a new, and at that time impenetrable, defence against counterfeiting. This adaptation of the "geometric lathe," although but the new application of an old principle, was nevertheless so successfully employed by Mr. Spencer that he justly received as high credit as if he were the original inventor. The peculiar advantage of lathe work in bank note engraving will be spoken of in the description of the different processes hereafter. The first lathe machine made by Mr. Spencer is now in the possession of Cyrus Durand in New York. In 1818 Mr. Perkins, attracted by the liberal propositions for competition offered by the bank of England, went to London, accompanied by Mr. Fairman and a number of experienced workmen. The superiority of Mr. Perkins's work was immediately perceived, but not so readily acknowledged; and unfortunately for his prospects, a London wood engraver, Mr. Darton, succeeded after many efforts in making a woodcut copy of one of his pieces of lathe work, a circumstance which was used as so powerful an argument against the American competitor that he was obliged to withdraw from the contest, and the privilege of manufacturing their notes was awarded by the bank to Messrs. Applegarth and Cowper, in 1820. But so confident was Mr. Perkins in the security of his notes, that soon after, when supplying a bank in Ireland, he voluntarily agreed, if they should be forged, to furnish a new issue without charge. Mr. Fairman and the other Americans returned home not long after, leaving Mr. Perkins, who established a partnership with Mr. Heath, an eminent engraver of London, which lasted during his life. Mr. Perkins's improvements have extended throughout England, and have been used on the continent, though in a comparatively small degree, as bank notes are there generally engraved upon a different and less complicated, as well as less artistic plan. In the United States the rapid increase of banks occasioned a demand for variety and beauty in notes almost insatiable. Bank note engraving companies were formed in various parts of the Union, but never became very numerous in consequence of the large amount of capital required to carry on this business, and more especially the difficulty of procuring first rate artists and mechanics. For a long time the business was immensely profitable, and indeed has remained so to the present, excepting when excessive competition has greatly lowered the prices. In 1857 there were 5 or 6 principal companies in the United States, most of which extended their operations by branch houses in every direction; but in May, 1858, all the important companies were united in one general organization, under the title of "The American Bank Note Company." This company now performs nearly all the bank note engraving and printing required in North and South America. It is admirably administered, and its operations are so thoroughly systematized, that the chances of extensive counterfeiting of its notes, or of alteration of notes of a low denomination to those of greater value, are very small. It should, however, be understood that it is impossible to interpose a completely effectual preventive against counterfeiting. Whatever can be done can be repeated. Each bank note legitimately produced can be fraudulently imitated with such similarity as to deceive even the most practised eye. But by the employment of the highest capabilities of the art, and by securing the services of the finest workmen, it is also possible to keep so far in advance of what the less skilful forgers can hope to do, that the danger need never be great provided proper care be exercised by the public itself. It is the anxiety on the part of bank note companies to prevent counterfeiting by availing themselves of the best talents, and employing every artistic expedient, as well as the desire to obtain patronage by the production of attractive notes, that has contributed to raise the standard of bank note engraving in this country to its present elevation. Some of the names most distinguished in connection with this subject have already been mentioned. Prominent in the development of the art since the time of Perkins and Spencer were J. W. Casilear and James Smillie. The former excelled as a designer and in the vigorous and masterly use of the graver, whose capabilities he would seem almost to have exhausted; the latter became eminent for the exquisite delicacy of his etchings, and although he never confined himself to bank note work, yet his engravings have been a standard guide to all students. Among those who have combined the various requirements of the art, possessing equally intimate acquaintance with its minute details and its higher attainments, Timothy House is considered foremost. The works of these artists have adorned a large proportion of the bank notes which have been circulated for the past 25 years, and their superiors, altogether considered, have not yet appeared.—We have now to say a few words of the actual processes of bank note engraving, as it is carried on in the United States; for here alone is it seen in perfection. The present bank of England notes are, for example, printed from an electrotype surface, as wood engravings are; a system fatal to all delicacy in the work, although possessing the advantages of speed and cheapness. According to this system, introduced by Mr. Smee, in 1855, the original engravings of the various portions of the note are not printed from directly, but are used as moulds from which electro-casts are taken; the notes are then printed upon a steam press from these electrotypes. The notes of the bank of France are also printed from a surface, although in a neater and more elegant manner than in England. The American bank note engraver confines himself to line engraving; the stipple, mezzotint, aquatint, and other varieties not being sufficiently distinct or delicate to be of service to him. In order to prevent as far as possible attempts at imitation, it is necessary to produce the most elaborately fine engravings; and for additional security, sections of bank

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note decorations are cut by machinery with an exquisite minuteness which could not be accomplished by hand. The pictorial portions of the modern bank note are the vignette or centre piece, usually placed near the middle, at the top, the end pieces, and the tail piece at the bottom. The arrangement of these varies according to the taste of the bank note designer, and their positions are often reversed. The counters, on which are fixed the denomination numbers, 1, 2, 3, 5, &c., are of intricate lathe work, and generally, though not necessarily, occupy the upper corners, for the sake of convenience in counting. The pictures are originally engraved on separate small plates, and are thence transferred to the bank note plates by the process invented by Mr. Perkins. The small plate is softened, and thoroughly annealed before passing into the engraver's hands. After his work is done, it is hardened by restoring its carbon, and the whole engraving transferred to new plates as desired. The average cost of engraving a vignette of ordinary size is $125; an end piece or portrait costs about $75; and a tail piece about $20. By the aid of the transferring process, bank note companies are able to furnish a steel note plate for $125, which otherwise, as it appears, would cost $300 for pictorial engraving alone, leaving out of question the machine work and the letter engraving. The time required to engrave a vignette varies from one to two months. A transfer can be effected in 15 minutes or less. The counters of notes are cut by the lathe machine, as improved by Mr. Spencer, in every form of intricate and involved regularity. They cannot be imitated except by similar machines, which it is not in the power of counterfeiters to easily procure, or even to use successfully. Sometimes lathe-work counters are drawn with a diamond point upon a plate covered with etching ground, and bitten in with acids; and again counters have been produced by medallion rulings, also bitten in; but both of these processes, having been found inferior to the first, have been almost entirely discontinued. After the lathe-work patterns have been cut upon soft steel, the large figures of denomination are cut over them by the letter engraver, and the plates are hardened, to be transferred. It is seen that thus the principal work of manufacturing bank note plates is done by the transferring press, and in most cases even the lettering, titles, dates, &c., are similarly stamped. Bank note companies have always on hand a large assorted stock of engravings, ready to be transferred in every variety of combination. Sometimes, for additional security, a bank requires one or more special engravings, for which it pays, retaining the exclusive right to use them. The expense of a set of plates, for a bank of ordinary capital and business, ranges from $900 to $1,200. Notes are usually arranged 4, 3, or 2 together, upon large thin plates of steel; but are sometimes, to facilitate the printing, put upon separate thick blocks. For the notes of low denominations, 1, 2, 3, 5, 10 and 20, steel is always used, so that the large number of impressions needed may be obtained without great difficulty. Twenty thousand notes can be printed from a steel bank note plate, and by retouching and retransferring it may be so restored as to yield almost as many more. The 50, 100, 500, and 1,000 dollar notes, of which fewer are needed, are sometimes put upon copper, which will give only about 3,000 impressions. For a single steel plate $125 is charged; for a copper plate, $75. Until recently, banks were able to procure notes at a cheaper rate by means of a "general plate," which was so constructed that any required title could be inserted in an otherwise unalterable block. By this plan many banks circulated notes precisely alike, with the single difference of the name of the bank; and thus offered decided advantages to counterfeiters, which were systematically made use of. But the "general plate" system has been put aside by the "American Bank Note Company," and is not likely to be revived. Plates for bank checks, drafts, certificates of stock, &c., are frequently engraved in the same manner as notes.—The printing of bank notes is a labor demanding extreme care at every step. The ink must be nicely ground and mixed, and of the finest quality. The paper needs to be wetted with exact regularity. The best workmen can hardly print more than 600 impressions in a day, whereas by the coarser electrotype process of the bank of England, in which any number of duplicate plates may be used, it is customary to throw off 3,000 in an hour. After printing, the sheets are laid away to dry for 2 or 3 weeks, and are then put between pasteboards, and smoothed by a heavy hydraulic pressure. Sometimes a high polish is imparted by pressing the notes between hot steel plates, but this destroys the strength of the paper. As the principal aim of banks is to protect their notes as thoroughly as may be from counterfeits and alterations, many expedients in printing have been devised to that end. One of these is the application of large letters and figures in red, printed from types, on the back as well as the face of the note. For some years this plan was very generally resorted to, though it was known to be theoretically imperfect, and of little real value. A more recent device is that of covering the paper before the note has been printed with a colored tint, communicated from a plate of fine and faint lathe work. The special object here is to prevent, not counterfeit engraving, but copying by photography, which has come to be considered the greatest danger to which bank notes are exposed. The American association for the advancement of science, in its meeting at Montreal, in 1857, discussed at length this subject of photographic reproduction of bank notes, but threw no light upon it. It is understood that photography cannot communicate colors, but unfortunately no tint has yet been discovered which may not be chemically removed from the paper. The tint once removed, the photographing of the black body of the note, which is suffered to remain, may of course be effected, and

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the color subsequently restored with a brush or otherwise. It is doubted by chemists whether any positive preventive against photographic counterfeiting can be provided; but by certain appliances, notes may be so prepared that imitations must be immensely difficult and expensive, and only to be accomplished by first class artists and mechanics. The expense of printing plain bank notes is $2 50 per hundred sheets, each sheet containing 4 notes. The charge is greater when colors are applied, according to the nature of the application. (For ENGRAVING on precious stones, see GEM).

ENNEMOSER, JOSEPH, a German physiologist, born in Tyrol, Nov. 15, 1787, died in Egern, Upper Bavaria, Sept. 19, 1854. In early life he was a shepherd, but having attended the school of his village, his love of learning induced several clergymen to send him to a gymnasium and afterward to the university of Innspruck. Among his classmates was the celebrated Hofer, whom he followed to the revolutionary war as secretary. He won distinction in the campaigns of 1813 and 1814, resumed his studies after the restoration of peace, was graduated as doctor of medicine in Berlin in 1816, officiated from 1819 to 1837 as professor in Bonn, afterward practised his profession at Innspruck, and in 1841 removed to Munich, where he gained a high reputation for his skill in the practical application of animal magnetism and for his writings on medical and physiological science. His most important works are: *Der Magnetismus* (2d ed., Leipsic, 1844; translated into English by William Howitt, under the title of "Natural History of Magic," 2 vols. 12mo., London, 1854); *Der Magnetismus im Verhältniss zur Natur und Religion* (2d ed., Tübingen, 1853).

ENNIS, a parliamentary and municipal borough and market town of Ireland, capital of the county of Clare, on the river Fergus, 112 m. W. S. W. from Dublin; pop. in 1851, 7,840. It is irregularly built, and the ruins of an ancient Franciscan abbey, founded in 1240, are its only noticeable architectural feature. It has 3 bridges across the Fergus, manufactories of linen and flannel, and considerable trade in agricultural produce. The borough returns one member to the house of commons.

ENNIUS, QUINTUS, the father of Roman literature, born in Rudiæ, a village of Calabria, 239 B. C., died 169. He claimed descent from a mythical hero, the first settler in his country, and in later life, after he had learned the Pythagorean doctrine of transmigration, he boasted that the soul of Homer dwelt in him. Nothing is known of his life till at the age of 38 years he appears as a soldier in the Roman army, enjoying the friendship of the elder Cato, by whom he was taken to Rome. There he taught Greek and Latin, but seems to have held no marked position till in 189 he made the Ætolian campaign under Fulvius Nobilior, gained the acquaintance and esteem of the elder Scipio and the most considerable Romans, and received the rights of Roman citizenship. From this time his learning and the charm of his conversation attracted to his little dwelling on Mount Aventinus the most enlightened citizens. Chronological reasons make it improbable that he was the instructor of the elder Cato in Greek, as was afterward asserted. His contemporaries marvelled at his learning, which in thoroughness and extent was surpassed by few of the later Romans. Though a master of Greek literature, he gave a thoroughly national character to his own works. The principal of these, entitled *Annales*, was a poem upon Roman history, which he treated consecutively from Romulus and Remus to his own times, describing later events with the greater fulness. This poem was popularly admired, and was the chief foundation of his fame. Its poetical merits were such that Virgil did not disdain in many places to imitate it, and as a history its value would be great to us; but though it appears to have existed in the 13th century, nothing but fragments of it gathered from the ancient writers now remain. These are sufficient to show that Ennius devoted great attention to his language, and contributed much in harmonizing and perfecting the yet rough and uncultivated Latin dialect. Ennius also wrote both tragedies and comedies, and adapted the masterpieces of Æschylus, Sophocles, and Euripides to the Roman stage. Among his numerous short pieces, his epigrams, 3 of which, extending collectively to 10 lines, have been preserved, were especially famous. The best collection of the fragments of Ennius is by Hesselius (4to. Amsterdam, 1707).

ENNS, or ENS (anc. *Anisus*, or *Anesus*), a river of Austria, rises in the circle of Saltzburg, on the northern slope of a branch of the Noric Alps, 12 m. S. of Radstadt, flows N. past that town, then E. N. E. through Styria, then N. separating the provinces of Upper and Lower Austria, and after a total course of 170 m. entering the Danube 2 m. below the town of Enns. Its principal affluents are the Steyer on the right, and the Salza on the left. It is navigable to Riefling, and its upper part lies amid wild mountain scenery. The archdnchies of Upper and Lower Austria are often called the provinces of the Enns, or Upper and Lower Enns.

ENNS, a town near the junction of the river Enns with the Danube, with manufactories of iron, steel, and cotton goods; pop. 8,500. A battle between the French and Austrians took place there, Nov. 5, 1805. Adjoining the town is the old castle of Ennseck.

ENOCH, the son of Jared, and father of Methusaleh, born, according to the Biblical chronology, A. M. 622. He is called "the seventh from Adam" (Jude 14), to distinguish him from Enoch the son of Cain, who was only the third from Adam. Eusebius infers from the title of "father of astronomy," given him by an old writer, that he is the same whom the Greeks worshipped under the name of Atlas. We read in the Scriptures that "he walked with God," and "pleased him." And as to his departure from the world, we are told, that "he was not,

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for God took him;" *i. e.*, that in his case, as in that of Elijah, the body without suffering ordinary dissolution was clothed with immortality, or endued with the immortal principle by the immediate power of God. The character of Enoch is drawn by two apostles (Heb. xi. 5, 13, and Jude 14, 15). The last passage has been the subject of much controversy, referring as it does to a prophecy by Enoch, some portions of which it cites apparently in the language of the prophet himself. A prophetical work called the "Book of Enoch" is frequently mentioned in the writings of the fathers. It is noticed by Justin Martyr, Irenæus, Clement of Alexandria, Tertullian, Origen, Augustine, Jerome, Hilary, and Eusebius. Most of these considered it apocryphal, though Tertullian maintained its authenticity and defended it from the criticisms of his contemporaries. Bruce, the traveller, brought home from Abyssinia 3 copies of the book in the Ethiopic language, which immediately excited great interest in Europe. The eminent orientalist De Sacy translated some portions of it, and a complete English version by Dr. Laurence, professor of Hebrew at Oxford, appeared in 1826. In 1833 a second, and in 1838, a third revised edition appeared. The book is supposed to have been originally composed about the time of the Christian era, in the Hebrew or Chaldee language. The Ethiopic version, however, was not made from the Hebrew, but from a Greek translation which is not now extant.

ENSIGN (Lat. *insigne*, a standard), in ancient warfare, a banner designed to communicate telegraphic signals rather than to be a centre for rallying. Near the end of the middle ages, it was a secondary color borne after the national banner or the pennon of the general. Machiavelli regrets that in his time ensigns had become of little use, and were merely the furniture of parades. Subsequently the name was given to the colors of infantry, and also to the bearer of the colors, who was the first sergeant. Still later the colors were borne by cadets, who were in the line of promotion to lieutenancies; but the function afterward returned to the ensign. The grade of ensign is still retained in the English, Prussian, and Austrian armies, but the word no longer designates the colors of infantry or the standards and guidons of cavalry. The Prussian ensign is not an officer, and the English ensign is thus designated without necessary reference to the colors. His duties are those of a subaltern officer.—In naval language, the ensign is the banner or flag hoisted on a long pole, over the poop, called the ensign staff. The ensign is also the lowest of the officers of the French navy, and has the rank of a first lieutenant of artillery, but the flag is not specially intrusted to him.

ENTABLATURE (Lat. *tabulatum*, a stage or story), in architecture, the horizontal continuous work which is supported by the columns. It has 3 principal divisions: the architrave, which rests upon the capitals of the columns, the frieze immediately above it, and the cornice at the summit. The height of the entablature, according to the most commonly received opinion, ought to be generally two diameters of the column, but it varies somewhat in different orders; in the temple of Minerva at Athens, one of the purest examples known of the Grecian Doric style, it is almost exactly two diameters.—The term entablature or entablement is also applied to the last course of masonry on a wall, immediately under the roof.

ENTAIL, an expression used in the old books for an estate in tail (mediæval Lat. *feudum talliatum*, from *taliare*, to cut off), signifying a truncated inheritance, as being carved out from a larger estate, or perhaps from the exclusion of certain heirs. For the nature of this species of inheritance, see ESTATE.

ENTERITIS (Gr. *εντερον*, an intestine), a medical term denoting acute inflammation of the external or peritoneal coat of the intestines, as distinct from inflammation of the mucous coat. This is a painful and dangerous disease, and not unfrequently terminates in gangrene in a few hours from the first attack. Its symptoms, which can seldom be mistaken for those of any other complaint except colic, with which it is closely allied, and which indeed is apt to originate it, are fever, frequently preceded by chilliness, fixed pain in the abdomen, costiveness, and in most cases vomiting. The pain is restricted to a small part of the abdomen, or spreads over its whole surface, according as the inflammation extends to the whole or part of the intestines; it is commonly severest about the navel, and is always increased by pressure. This pain is generally the first manifestation of the disease. As it becomes more intense the bowels seem drawn together by a kind of spasm, the features grow sharp and compressed, and afterward, if the attack be very severe, are much sunken, giving the countenance a wild and fearful expression. The brain usually but not always remains unaffected. The causes of this disease are acrid and indigestible substances taken into the stomach in large quantities, indurated fæces, high living, long continued costiveness, strangulated hernia, spasmodic colic, the involution of one fold of the intestine within another, application of cold to the belly or the extremities, and cold drinks when the body has been previously over-heated. It attacks persons of every age, from childhood to the most advanced period of life, but old persons are most subject to it.

ENTOMOLOGY (Gr. *εντομον*, insect, and *λογος*, discourse), the branch of natural history which treats of insects, one of the classes of articulated animals. That part of the science which refers to the anatomy and physiology of the class will be treated under the head of INSECTS; and the particular descriptions of orders, families, genera, and species will be found under their various scientific and popular titles. This article will be devoted to the history of entomology, and to brief sketches of the principal systems of classification. In entomology, more

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perhaps than in any other department of natural history, does the student feel the want of a natural classification; but, as the best authors have devoted very unequal study to different groups, from the impossibility of fully cultivating every portion of the immense field, no classification complete and natural in all its parts can be found; the second Cuvier is yet to arise who shall form from the scattered though admirable fragments a truly natural system of entomology. The descriptive portion of the science is as yet very incomplete; when we consider the great number of known species, and the small size of most of these in carefully studied districts, and our comparative ignorance of the insects of foreign countries, it must be confessed that the nearly 100,000 species now described probably do not form one-half of the total number in existence. If we take for a basis the comparative ratio which has been found to exist in Germany between insects and plants, that of 2 to 1, and extend this to the whole world, we should have in round numbers at least 400,000 species of insects inhabiting the earth.—It appears that Aristotle, the father of natural history, separated insects from crustacea, and divided them into winged and wingless, subdividing these last into several natural minor groups so successfully as to excite the surprise and admiration of modern observers. From Aristotle we may pass over a period of 1,800 years, a blank as far as the progress of natural history is concerned, to the middle of the 16th century, when Gesner, a Swiss, revived the study of animals, leaving valuable papers on insects from personal observation, which were published after his death by Mouffet, in 1634. During the next 100 years Aldrovandus divided insects into 2 chief groups, land and water insects, subdividing them according to the structure of their wings and legs; Hoefnagel made beautiful figures of them; Redi studied their origin and mode of propagation; Malpighi made a careful dissection of the silkworm; Goedart and Valisnieri described the metamorphoses of insects; Leeuwenhoeck examined them microscopically; and Madame Mérian studied the development of the lepidoptera, going to Surinam in her scientific zeal to continue her observations among the most gorgeous species. The writings of Swammerdam, a Dutch naturalist in the middle of the 17th century, created a new epoch in the annals of entomology. He studied the metamorphoses of insects, and from these introduced the first attempts toward a natural classification. His system was as follows: I. Insects without a metamorphosis, changing their skin but not their form, as spiders, lice, wood lice, and myriapods. II. Insects with a metamorphosis: *a*, those moving in all stages of existence, at first wingless, then with rudimentary and finally with entire wings, including what are now called *neuroptera*, *orthoptera*, and *hemiptera*; *b*, motionless in the pupa state, but having limbs, including the *hymenoptera*, *coleoptera*, and *lepidoptera*; *c*, ovate pupæ, wingless and motionless, as the *diptera*.—John Ray, an English clergyman living in the latter part of the 17th century, was the first true systematist, and doubtless furnished Linnæus with many of the ideas afterward successfully worked out by him. In a "History of Insects," published after his death in 1705, is the following arrangement: I. Insects without metamorphosis, including: 1, *apoda* (annulate worms), terrestrial and aquatic; 2, *pedata*, including the terrestrial (lice) and aquatic hexapods, the octopods (spiders), lobsters and crabs, the terrestrial polypods (centipedes and wood lice), and the aquatic polypods (*amphipoda* and *isopoda* of Latreille). II. Insects with metamorphosis, including: 1, those with moving larvæ and pupæ (*orthoptera* and *hemiptera*); and 2, those with motionless pupæ, as *coleoptera*, *lepidoptera*, *diptera*, and *hymenoptera*. III. Insects with simple metamorphosis, moving through most of the stages, like the dragon-flies.—Réaumur, in the middle of the 18th century, published his *Mémoires pour servir à l'histoire des insectes*, affording valuable information on the habits of insects, but wanting in systematic arrangement. About the same time, in 1735, appeared the *Systema Naturæ* of Linnæus, who displayed in the classification of insects the same intuitive perception of the characters of groups that is observable in his other branches of the animal kingdom. His system is based on the characters of the wings and the presence or absence of a sting; as follows: I. Insects with 4 wings, including the following orders: 1, *coleoptera*, with the anterior wings crustaceous, with a straight suture; 2, *hemiptera*, with semicrustaceous incumbent anterior wings; 3, *lepidoptera*, with all the wings covered with scales; 4, *neuroptera*, with all the wings membranous, and with no sting in the tail; 5, *hymenoptera*, with membranous wings and tail armed with a sting. II. Insects with 2 wings, comprising, 6, *diptera*, with poisers in place of the posterior pair. III. Insects with neither wings nor elytra, including, 7, *aptera*, in which were placed by Linnæus the hexapod lice, fleas, &c., spiders, crabs, and centipedes. The fault of this system is its exclusive principle of division drawn from the wings, which placed among the *aptera* animals far removed from insects proper.—De Geer, a Swede, published a work on insects between 1752 and 1778, having the same title as that of Réaumur, of which it may in some respects be considered the sequel; his system is intermediate between that of Linnæus and that of Fabricius, who came after him, being based both upon the organs of flight and those of manducation, and according to Mr. Kirby is more natural than that of either of the above-named naturalists. It is as follows: I. Insects with wings, *alata*, including: A. *Gymnoptera*, or those with 4 wings without cases, with the subdivisions: 1, *lepidoptera*, with scaly wings and spiral tongue; 2, *elingula*, with naked membranous wings, no teeth nor tongue (*trichoptera*, *ephemerina*); 3, *neuroptera*, with membranous, equal, reticulated wings, and teeth

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in the mouth (as *libellulæ* and other Linnæan *neuroptera*); 4, *hymenoptera*, with membranous unequal wings, teeth in the mouth, and a sting or borer in the females; 5, *siphonata*, with membranous wings and tongue bent beneath the breast (*homoptera* of Leach), including the *aphides* and *cicadæ*. B. *Vaginata*, or those with 2 wings covered by elytra, with the subdivisions: 6, *dermaptera*, with elytra half coriaceous and half membranous, crossed, a pair of membranous wings, and tongue bent beneath the breast (*hemiptera* of Leach), as the bugs and water bugs; 7, *orthoptera*, cockroaches and grasshoppers; 8, with teeth in the mouth, and the wings of beetles (*coleoptera*). C. *Diptera*, with 2 uncovered wings, including: 9, *halterata* (the *diptera* of Linnæus), having a pair of poisers, mouth with a tongue without teeth; 10, *proboscidea* (like the genus *coccus*), with no poisers, tongue, or teeth in the male, and no wings, but a tongue in the breast of the female. II. Insects without wings, *aptera*, including: D. *Saltatoria*, with the subdivision: 11, *suctoria* (*culex*), undergoing metamorphosis, with 6 legs, and mouth with tongue, the *aphaniptera* of Kirby. E. *Gressoria*, with the subdivisions: 12, *aucenata*, undergoing no metamorphosis, with 6 legs, and head and trunk distinct, as *termes*, *pediculus*, *psocus*; 13, *atrachelia*, spiders and crabs; 14, *crustacea*, as isopods, amphipods, and myriapods. This system, though not purely artificial, and founded on several correct principles, is yet far from natural, and includes among insects animals which do not belong with them; his 14 orders comprised only about 1,500 species referable to 100 genera.—Geoffroy, in France, in 1764, published a system which is important from the introduction of the joints of the tarsi as a means of classification; he makes only 6 groups, *coleoptera*, *hemiptera*, *lepidoptera*, *tetraptera*, *diptera*, and *aptera*, the 3d, 5th, and 6th being the same as the Linnæan; it is an exceedingly unnatural system.—Fabricius, a German, a pupil of Linnæus, introduced important improvements into the science during the last quarter of the 18th and the beginning of the 19th century; his system is based upon the number, proportions, form, and situation of the parts which constitute the mouth, without regard to other parts of the insect; by building upon this narrow foundation he departed widely from nature, though by drawing attention to the maxillary system he has enabled his successors to define certain groups with considerable accuracy. His first classification of 1775 was greatly modified in the course of his life, and the following was proposed by him in his *Entomologia* in 1798:

I. Insects with Biting Mouths.

A. Two pairs of mandibles.
  a. The lower ones having palpi.
    1. Free without covering. . . . . 1. Class *eleutherata* (beetles).
    2. Covered. . . . . 2. " *ulonata* (*orthoptera*).
    3. Connate with the labium. . . . . 3. " *synistata* (*neuroptera*).
    4. Distended, thin, coriaceous. . . . . 4. " *piesata* (*hymenoptera*).
    5. Horny, strongly toothed, labium without palpi. . . 5. " *odonata* (*libellulæ*).
  b. All without palpi. . . . . 6. " *milosata* (*scolopendra*).
B. A pair of scissor-like maxillæ. . . . . 7. " *unogata* (scorpions and spiders).
C. More than 2 pairs of maxillæ.
    1. Within the labium. . . . . 8. " *polygonata* (*isopoda*).
    2. Outside the lip, closing the mouth. . . . . 9. " *pleistagnatha* (short-tailed crabs).
    3. Outside the lip, but covered by the palpi. . . 10. " *exochnata* (long-tailed crabs).

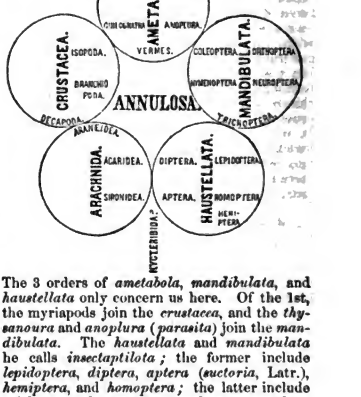
II. Insects with Suctorial Mouths.

1. In the mouth a spiral tongue. . . . . 11. Class *glossata* (*lepidoptera*).
2. A horny proboscis, with jointed sheaths. . . . . 12. " *rhyngota* (*hemiptera*).
3. A soft, unjointed proboscis. . . . . 13. " *antliata* (*diptera*).

The facility with which genera were determined by this system secured for it many followers, in spite of its unnaturalness; and Illiger, by uniting it with that of Linnæus, considerably improved it. He made order 1 of Linnæus correspond with class 1 of Fabricius; 2 L. with 2 and 12 F.; 3 L. with 11 F.; 4 L. (to which were added *termes*, *lepisma*, and *podura*) with 3 and 5 F.; 5 L. with 4 F.; 6 L. (with *pediculus* and *acarus*) with 13 F.; and 7 L. (without the above-named apterous genera) with 6, 7, 8, 9, and 10 F.—Olivier, in the article *Insectes* in the *Encyclopédie méthodique*, follows chiefly the Linnæan classification, modified by Geoffroy and De Geer, making use of the wings and elytra, the parts of the mouth, and the joints of the tarsi, in his divisions; he substituted the term *orthoptera* for the *dermaptera* of De Geer; in his order *aptera* are still included spiders, crabs, and myriapods. In Olivier's great work on *coleoptera*, in 6 large quarto volumes with nearly 400 plates, published between 1789 and 1808, may be found the largest collection of representations of this order yet known.—Latreille's first work, published in 1796, presents the insects of Linnæus in 14 classes, adding *orthoptera* to the Linnæan system, and separating the *aptera* into *suctoria*, *thysanoura*, *parasita*, *acephala*, *entomostraca*, *crustacea*, and *myriapoda*; this system, though in many respects unnatural, claims the positive merit of introducing some natural families. In 1810 he adopted a new classification, following Cuvier and De Lamarck in separating crustacea and arachnids from insects proper, and dividing the latter into the 7 orders of his 1st classification, adding the order *suctoria* (formed entirely by the genus *pulex*). In 1817 he added *myriapoda*, *thysanoura*, and *parasita* to his 8 orders, and also *strepsiptera* of Kirby; in 1825 he raised the *myriapoda*, after Leach, to a distinct class, and divided the *insecta* into 11 orders; in 1829 he reduced the *myriapoda* to an order among insects, raising the number again to 12 orders, and in 1832 raised them again to a class intermediate between arachnids and insects. One

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great merit of Latreille is that he gave family names to the groups of genera, which Macleay has reduced to system by giving to them the termination *idæ*, which, if not always classically correct, is of advantage for uniformity and euphony.—De Lamarck divided insects into 8 orders: I. Insects with suctorial mouths: 1, *aptera* (*suctoria*, Latr.); 2, *diptera;* 3, *hemiptera;* 4, *lepidoptera*. II. Insects with mandibulate mouths: 5, *hymenoptera;* 6, *neuroptera;* 7, *orthoptera;* and 8, *coleoptera*. Other *aptera* he placed among arachnids and crustacea, and ranked *thysanoura*, *myriapoda*, and *parasita* among arachnids.—Duméril places insects above mollusca in the animal series, and comprises among them arachnids and myriapods; his arrangement differs but little from the Linnæan; he endeavored to reunite the greatly divided families, and to reduce the number of genera.—Before passing to other classifications the philosophical systems of the modern German school may be alluded to; they proceed on the view that organic nature is one great whole, exhibiting progressive grades of development, which are characterized as classes. Oken has made 13 classes of animals, each represented by a successively added organ. Insects form the 9th class, and are called lung-animals; they are divided as follows: I. Germ flies, with perfect metamorphosis, with tribes: 1, *hemiptera;* 2, *orthoptera* and *dermaptera;* 3, *neuroptera*. II. Sexual flies, with perfect metamorphosis and equal wings, with tribes: 4, *diptera* and *suctoria;* 5, *hymenoptera;* 6, *lepidoptera*. III. Lung-flies, beetles, with perfect metamorphosis, elytra, and wings, with tribes: 7, *C. tetramera;* 8, *C. heteromera;* and 9, *C. pentamera*.—Among the English writers who have contributed to the advance of entomological classification, may be mentioned Leach, Kirby, and Macleay. Dr. W. E. Leach published several elaborate treatises on insects in the "Linnæan Transactions," and in the British and foreign encyclopædias; his system is sketched in vol. iii. of the "Zoological Miscellany." He divides insects into *ametabola* and *metabola*, according to the absence or occurrence of metamorphosis, the 1st including 2 and the latter 14 orders; he subdivides *orthoptera* into 3 orders, adding *dermaptera* (*forficula*) and *dictyoptera*, and introduces also *omoptera* and *omaloptera*.—The classification of Kirby and Spence, as given in vol. iv. of the "Introduction to Entomology" (1815–'26), is as follows: I. *Mandibulata*, or insects with mandibles, containing the orders: 1, *coleoptera;* 2, *strepsiptera;* 3, *dermaptera;* 4, *orthoptera;* 5, *neuroptera;* and 6, *hymenoptera*. II. *Haustellata*, or insects with suctorial mouths, containing the orders: 7, *hemiptera;* 8, *trichoptera;* 9, *lepidoptera;* 10, *diptera;* 11, *aphaniptera;* and 12, *aptera* (all wingless insects breathing through tracheæ). It has been objected to this system that the 3d order is improperly separated from the 4th, and that the 8th forms naturally a part of the 5th.—The system of Macleay is founded on the following principles: 1, all natural groups return within themselves, and consequently present themselves in the form of circles; 2, each of these circles contains 5 others, connected in the same way; 3, where the circles join, there are intermediate groups connecting them more closely together; 4, the members of each, at the points where the circles meet, exhibit analogies. The animal kingdom consists of 5 circles, one of which, the *annulosa* (crustacea and insects), consists of 5 principal groups, which may be represented as follows:



The 3 orders of *ametabola*, *mandibulata*, and *haustellata* only concern us here. Of the 1st, the myriapods join the *crustacea*, and the *thysanoura* and *anoplura* (*parasita*) join the *mandibulata*. The *haustellata* and *mandibulata* he calls *insectaptilota;* the former include *lepidoptera*, *diptera*, *aptera* (*suctoria*, Latr.), *hemiptera*, and *homoptera;* the latter include *trichoptera*, *hymenoptera*, *coleoptera*, *orthoptera*, and *neuroptera*. These two circles are contiguous to each other in the *trichoptera* and *lepidoptera*, the genus *mystacides* (Latr.) of the former making the transition to *aglossa* (Latr.) of the latter. Space will not permit the introduction of the families which he considers the connecting links between the orders of the two great divisions. This system, while it has many forced and unnatural affinities, presents much that is valuable in determining the groups of transition, which are found among insects as among other branches of the animal kingdom. His principal work, *Horæ Entomologicæ*, was published in 1819–'21.—Burmeister divides insects, according to the completeness of their metamorphosis, into *ametabola* and *metabola*, each group presenting both *haustellata* and *mandibulata*, and subdivided according to the form of the larva, the structure of the wings, and the internal organization. His system is as follows: I. *Insecta ametabola*, with imperfect metamorphosis; the larva, pupa, and perfect insect resembling each other, the pupa eating

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and moving about: A. Having a suctorial mouth, with 4 fine setæ enclosed in a sheath, and the palpi wanting, with order 1, *hemiptera* (bugs). B. With a masticating mouth: *a*, with 4 unequal wings, anterior ones leathery, the posterior membranous and folded longitudinally and once transversely; prothorax free, and many biliary vessels; with order 2, *orthoptera* (locusts); *b*, with 4 generally equal wings, never folded, with order 3, *dictyoptera* (cockroaches). II. *Insecta metabola*, with perfect metamorphosis; the larva a worm, of 13 segments, with or without legs; the pupa motionless, or, if it moves, not eating. A. With suctorial mouth: *a*, with 2 naked transparent wings, the posterior replaced by pediculated knobs; 4 biliary vessels; larvæ without feet; soft proboscis, with several setæ and a pair of palpi; prothorax not free; with order 4, *diptera* (flies); *b*, with 4 wings, generally covered with scales, 6 biliary vessels; larvæ with feet and a distinct head; the maxillæ forming a spiral tongue; prothorax not free, but closely connected with the mesothorax; with order 5, *lepidoptera* (butterflies and moths). B. With masticating mouth, or at least visible mandibles and palpi: *a*, with 4 equally large or long wings, with reticulated nervures; rarely more than 8 biliary vessels; prothorax always free; with order 6, *neuroptera* (dragon flies); *b*, with 4 unequal wings, with variously branching nervures; larvæ generally without head or feet, yet sometimes with both; many biliary vessels; prothorax not free; with order 7, *hymenoptera* (bees, wasps); *c*, with 4 unequal wings, the anterior ones corneous; larvæ with head, with or without feet; 4 or 6 biliary vessels; prothorax always free; with order 8, *coleoptera* (beetles). In almost all these orders there are apterous families, genera, and species, whose place may be determined by their metamorphosis and the structure of the mouth; but they never form a distinct order like the *aptera* of Latreille. Burmeister maintains that all true insects undergo some metamorphosis, though in the apterous forms it may be difficult to detect it from the absence of the wings; as his idea of an insect necessitates metamorphosis, however imperfect, he gives the name *ametabola* (applied by Leach to apterous insects) to all those with an imperfect metamorphosis, as there is no real difference in the process of development in each.—Westwood, in his "Introduction to the Modern Classification of Insects," in 1839, gives the following:

I. Mouth with Jaws.	II. Mouth with a Sucker.
Order *hymenoptera.*	Order *diptera.*
Osculant order, *strepsiptera.*	Osc. ord. *homaloptera.*
" *coleoptera.*	" *aphaniptera.*
Osc. ord. *cuplexoptera.*	" { *heteroptera* (including the water bugs.)
" *orthoptera.*	" *homoptera.*
" *neuroptera.*	" *lepidoptera.*
" *trichoptera.*	

Stephens, in the article "*Insecta*," in vol. ii. of the "Cyclopædia of Anatomy and Physiology" (1839), divides insects into: I. *Mandibulata*, containing *coleoptera*, *dermaptera* (ear-wigs), *orthoptera*, *neuroptera*, *trichoptera* (caddis flies), *hymenoptera*, and *strepsiptera*; and II. *Haustellata*, containing *lepidoptera*, *diptera*, *homaloptera*, *aphaniptera*, *aptera*, *hemiptera*, and *homoptera*.—Siebold (Burnett's translation), in 1848, gives the following classification: A. Insects without metamorphosis, *ametabola*, containing: 1, *aptera* (*pediculidæ*, &c.). B. With incomplete metamorphosis, *hemimetabola*, containing: *a*, with suctorial month, 2, *hemiptera*; *b*, with mandibulate month, 3, *orthoptera*. C. With complete metamorphosis, *holometabola*, containing: *a*, with suctorial mouth, 4, *diptera*; 5, *lepidoptera*; 6, *hymenoptera*; *b*, with mandibulate month, with 7, *strepsiptera*; 8, *neuroptera*; and 9, *coleoptera*. This is the same as the classification of Vogt, founded upon embryological principles; and the orders are the same as those of Owen, as given in the 2d edition of his "Lectures on the Comparative Anatomy and Physiology of the Invertebrate Animals" (1855), except that *homoptera* is substituted by him for *hemiptera*. The orders of Milne-Edwards, in his *Cours élémentaire d'histoire naturelle* (1855), are nearly the same as Siebold's, except that *aptera* is omitted, *rhipiptera* substituted for *strepsiptera*, and *anoplura* and *thysanoura* are added. The embryological system of Van Beneden (1855) is the same as the last, the term *strepsiptera* being reintroduced, and *parasita* substituted for *anoplura*.—Prof. Agassiz, in the 2d volume of the "Smithsonian Contributions to Knowledge" (1851), gives the following classification of insects from embryological data:

I. Chewing Insects (*Mandibulata*).	II. Sucking Insects (*Haustellata*).
Neuroptera.	*Hemiptera.*
Coleoptera.	*Diptera.*
Orthoptera.	*Lepidoptera.*
Hymenoptera.	

In this the subdivisions are made according to their transformations. From the fact that those undergoing complete metamorphosis have a chewing apparatus in the early stages of their growth, which is gradually transformed into various kinds of suckers, he expresses the belief that the *mandibulata* are lower than the *haustellata*; and he also ranks *lepidoptera* highest among insects, and not *coleoptera*, as generally maintained.—This will suffice for entomological systems; the limits of this article will not permit even the mention of the principal writers in the different departments of the science. Mr. Wilson in the article "Entomology" in the "Encyclopædia Britannica," Dr. Burnett in his translation of Siebold, and Mr. Westwood (*op. cit.*), give valuable lists of the authors on this science, arranged in chronological order; from them we select the following as among the most important since Latreille: in England, Donovan, Curtis, Wood, Rennie, Haliday, A. White, Doubleday, Shuckard, Hope, Newman, and Newport; in France, Jurine, Dufour, Godart, Guérin-Méneville, Boisduval, Dejean, Lacordaire, and Blanchard; in Germany, Meigen, Ochsenheimer, Klug, Fischer de Waldheim, and Germar; in Sweden, Fallen; in America, Thomas Say, Dr. T. W. Harris, and J. L. Leconte. The most use-

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ful work on entomology ever published in this country is the "Treatise on some of the Insects of New England which are Injurious to Vegetation," by Dr. T. W. Harris, issued by order of the legislature of Massachusetts; the 2d edition was published in 1852, and a 3d will probably be soon published, with illustrations, at the expense of the state. In this work are adopted the 7 following orders, as generally received by naturalists; a brief sketch of these, with others accepted by many entomologists, will form a proper termination of this article: I. *Coleoptera* (or beetles), with jaws, 2 thick wing covers meeting in a straight line on the top of the back, and 2 filmy, transversely folded wings; metamorphosis complete; larvæ generally with 6 true legs and sometimes with a terminal prop-leg, rarely without legs; pupa with wings and legs distinct and unconfined. II. *Orthoptera* (cockroaches, crickets, &c.), with jaws, 2 opaque upper wings overlapping a little on the back, and 2 larger thin wings folded in fan-like plaits; transformation partial; larvæ and pupæ active, but without wings. III. *Hemiptera* (bugs and plant lice), with a horny beak for suction; 4 wings, of which the upper lie flat, cross each other on the back, and slope at the sides like a roof; transformation partial; larvæ and pupæ like the adults, but wingless. IV. *Neuroptera* (dragon flies, May flies, white ants, &c.), with jaws, 4 netted wings, the hinder the largest; with no sting nor piercer; transformation complete or partial; larva and pupa various. V. *Lepidoptera* (butterflies and moths), with a sucking tube; 4 scaly wings; transformation complete; larvæ with 6 true legs, and from 4 to 10 prop-legs; pupa with the cases of the wings and legs indistinct, and soldered to the breast. VI. *Hymenoptera* (bees, wasps, ants), with jaws; 4 veined wings, the hinder pair generally the smallest; a sting at the end of the abdomen; transformation complete; larvæ like maggots, or slugs, or caterpillars; pupæ with the legs and wings unconfined. VII. *Diptera* (flies, mosquitoes, &c.), with a horny or fleshy proboscis, 2 wings and 2 balancers or poisers behind them; transformation complete; larvæ footless maggots, with the breathing holes generally in the hinder part of the body; pupæ usually incased in the dried skin of the larvæ, but sometimes naked, in which case the wings and legs are visible, and more or less free.—Among the smaller groups, the order *strepsiptera* (Kirby), or *rhipiptera* (Latr.), contains minute insects which undergo their transformations within the bodies of bees and wasps; the maggot-like larvæ live between the rings; the females are wingless, and never leave the bodies of their host; the adult males have 2 very short members instead of fore wings, and 2 very large hind wings; the sharp-pointed jaws are adapted for piercing rather than biting. Their systematic position is not precisely determined; Latreille places them between *lepidoptera* and *diptera*, though he thinks them most nearly allied to some of the *hymenoptera*. The order *aptera* (Leach), *suctoria* (De Geer), *siphonaptera* (Latr.), *aphaniptera* (Kirby), is constituted by the flea tribe, which seem to be intermediate between *hemiptera* and *diptera*. The ear-wigs, included by most entomologists among *orthoptera*, form the order *dermaptera* (Leach), or *euplexoptera* (Westwood). The spider-flies, ticks, &c., alluded to at the close of the article Dipteba, form the order *homalopteva* (Leach). The May flies were separated from the *neuroptera*, and elevated to an order *trichoptera* by Kirby. The *thysanoptera* of Haliday consist of the minute insects of the *thrips* tribe, generally classed with the *hemiptera;* other *hemiptera*, as the harvest flies, plant lice, &c., have been separated by the English writers under the name of *homoptera*. Burmeister has separated from *neuroptera* those species which undergo only a partial metamorphosis into the order *dictyoptera*.—Naturalists generally have been disposed to rank insects in the animal scale below mollusca, though many of their vital functions, as of locomotion and perception, indicate a superiority in the former. Mr. Kirby and other English entomologists have accorded the precedence to insects, in opposition to Cuvier and De Lamarck, who placed the mollusca first on account of their system of circulation. In the branch of articulata, the position of insects is well given by Oken, when he says that "lepidoptera are born as worms, then pass into the condition of crustacea, and are finally developed into true insects, exemplifying the natural order of gradation of the three classes of articulata." For interesting and conclusive observations on the position that worms are the lowest, crustacea the intermediate, and insecta the highest among articulata, the reader is referred to the paper by Agassiz, above alluded to, in vol. ii. of the "Smithsonian Contributions;" the same authority, in vol. i. of "Contributions to the Natural History of the United States," in the highest class (insecta) of articulata, establishes the 3 orders of myriapods, arachnids, and insects proper, the latter therefore being the highest order of the highest class, and the lepidoptera (butterflies and moths) the highest division in this order.

ENTOPHYTES. See Epiphytes.

ENTOZOA (Gr. ἔντος, within, and ζῷον, an animal), a group of invertebrate animals, which during some period of their existence live within and derive nourishment from the bodies of other animals, and with few exceptions belong entirely to the class of helminths or worms. Animal parasites form in fact a sort of sub-fauna, and their number is only to be estimated by the extent of the animal kingdom. The classification of entozoa has been attempted by many eminent zoologists since the days of Rudolphi, who may be considered the father of helminthology, but only within a few years has it attained the position of a true science, and chiefly through the labors of a few observers in Germany. Cuvier refers the entozoa to the class *radiata*, and subdivides them, following the plan of Rudolphi,

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into *tænioidea* or tapeworms, *trematoda* or flat worms, *nematoidea* or round worms, and *acanthocephala* or hooked worms. More correctly, however, they belong to the *articulata*, though their type is a degraded one, and some of them even approach in structure the *mollusca*. Adopting this arrangement, we can best explain the progress and present state of helminthology by considering these subdivisions separately.—*Tænioidea*, *cestoidea*, *sterelmintha*, tapeworms. These parasites in their mature state inhabit the intestines of all classes of vertebrate animals. In their transitional or immature stage they occur as cysts in the tissues and organs of such creatures as form the food of their true bearers or hosts. These cysts, of which the measles in swine are an example, in the early days of science were not looked upon as of an animal nature, and were called hydatids and acephalocysts; and not until the latter part of the 17th century was their true character recognized. In the 18th, many observers, and especially Götze, noticed that their heads closely resembled those of the tapeworms. His observations were confined chiefly to the tæniæ of animals, and appear to have had little influence with the scientific men of the next century, who fell back again upon the old and easy theory of spontaneous or equivocal generation, and so it remained until 1844, when Steenstrup's theory of alternation of generation was applied to the problem; and Siebold and Dujardin both published essays on the connection between the tæniæ and encysted forms of various animals. Their experiments and those of Küchenmeister, who must be considered the highest authority on the human helminths, cannot be given in detail here; suffice it to say that tapeworms have been produced in carnivorous animals of all kinds by giving them the encysted forms to eat, and the encysted varieties have been bred in others by administering the eggs or embryos of tæniæ. Tapeworms consist of 3 parts, viz.: head, neck, and colony of joints. The head is a minute object, usually square, and provided with varieties of sucking disks and coronets of hooks, by which it attaches itself to the walls of the intestine. The neck is slender and marked by transverse wrinkles, which gradually are converted into joints. With age these joints increase in number, and finally those first formed become ripe, while new ones are continually given out from the head to supply in turn the place of those discharged. Their growth is generally rapid, and some species attain a length of 100 feet, while others are only a few lines long. Considered as a simple individual, the tapeworm has very limited power of motion, although a distinct layer of muscular fibre is found beneath the skin. This integument is soft, white, moist, and porous; and through this nutrition is probably carried on by absorption, though the only organs subservient to this function are 2 pairs of longitudinal canals running along each side of the joints, and united by transverse branches. The skin contains also innumerable roundish, concentrically marked, calcareous corpuscles, recognized only by the microscope, which serve undoubtedly as a sort of skeleton. They possess no nervous system. The sexual organs, however, are remarkably developed. When the oldest joints have become sexually mature (which period varies greatly in different species), they pass off spontaneously by the anus—sometimes by the mouth even—of the animal which harbors them. These are flat, quadrangular bodies of a yellowish white color, and in some species are detached singly, in others by groups. These proglottides, as they are called, are true hermaphrodites, contain the sexual organs and eggs or embryos enclosed within shells, and possess the power of moving about; so that they have often been mistaken for trematoda, and, in fact, are now considered as separate individuals. They discharge their eggs either through the genital opening or by self-destruction, which results either from the bursting of their walls or by decomposition. They affect chiefly moist places, and, leaving the manure in which they have been deposited, wander about amid the herbage, and may in this way be devoured; or they fall into water, and there, bursting, discharge their eggs, which are thus borne far and wide, and find entrance to a proper soil for future development. They are not capable of a long-continued independent existence, and may even be destroyed within the intestine of their host, scattering their eggs along this canal, though harmlessly; for Leukart found by experiment that eggs when introduced into the intestine before being subjected to the action of the gastric juice remain unchanged; but that when previously submitted to its influence and then placed within the intestinal canal, the embryos became free. Proglottides may even be swallowed entire by animals which wallow in moist manure, and thus introduce a vast number of eggs to their proper dwelling place. When once they have set their offspring free, their object is accomplished and they disappear. Each proglottis contains a vast number of eggs, so that if one out of the many millions reaches a proper habitation the species will continue without decrease in numbers. The embryos are enclosed in firm shells constructed to resist a strong pressure from without, and are either brown or yellowish, and of a round or oval shape. They probably cannot undergo a great degree of dryness, heat, or cold, or exist very long in fluid, without the destruction of the animal within. As an example of the usual method of development and transformation of the *cestoidea*, the history of the *tænia solium*, or common tapeworm, will best serve; for it has been most fully studied on account of its frequent occurrence in the form of measles, and its important relation to man. This worm is improperly named, since many are sometimes found in the same intestine. It seldom attains a length of more than 20 feet, and is composed of 600 or 700 joints, which when mature contain myriads of eggs, and escape singly or at

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once into the outer world. These eggs being set free find their way into water or manure, and are thus scattered far and wide. By chance one occasionally enters the stomach of man on lettuce, fruit, or unwashed vegetables, but more generally they are swallowed by the hog, the filthy and omnivorous habits of which animal need only be considered to show how readily it may become infected. In either case the egg shell is destroyed by the process of digestion, and the embryo, a minute globular vesicle, armed in front with 3 pairs of sharp spines, emerges and begins its active migrations. It sets out on its travels by boring into the blood or lymph vessels of the stomach or intestine, and is borne along by their currents till it reaches the capillaries, where it renews its activity and bores its way out of the circulatory system into any organ to which chance has carried it. There can be no doubt about this fact, for Leukart has recently discovered the embryo several times in the vena portæ. It is possible that the embryos may in some cases lose their hooklets in the vessels, and thus, being unable to proceed further, become encysted in the capillaries. Having reached thus a proper situation for higher development, it becomes surrounded by a new formation or cyst resembling the structure of the organ it may inhabit. If it happens to penetrate any serous cavity, however, this cyst is not formed, but otherwise the development is the same. This process goes on rapidly, so that in a week or two the cyst may be recognized by the naked eye. The spines or hooklets now drop off, the primary vesicle goes on absorbing nutriment, and by the second or fourth week there grows out a protuberance from its internal surface, which soon takes the form of the head of the future tænia. Upon this there springs up a double circle of small hairs, which in 6 weeks become the complete double coronet of hooks. The neck now begins to extend, but the head still remains enclosed in the bladder, till the whole animal is set free. It may however continue to live in this encysted stage till it dies of old age, unless set free by nature or art; and this undoubtedly is the fate of the largest proportion of these immature creatures. If seated in the muscles, this encysted stage of tapeworm is seldom of injury to man; but if by chance it take up its dwelling-place in the brain or eye, which is not unfrequently the case, results most serious follow. In the hog, however, the case is different, for many eggs being devoured at once, the embryos invade nearly every organ of the body, and produce the disease known as measles. We have still to consider the last and highest stage of development in the life of a tænia, viz.: the conversion of these cysts or measles into the mature intestinal worm. When one of these cysts is accidentally swallowed by man, the little pea-like vesicle bursts, and the head of the worm protruding fastens itself to the intestinal walls by its hooklets. From this head bud out one after another numerous joints, which finally make up the mature worm. It may be easily understood how these small white cysts gain entrance into the stomach of man, for measly pork is often sold in markets, and although thorough cooking and curing destroy the larvæ, still the cysts may adhere to the knife, and be thus transferred to vegetables, butter, cheese, and the like, which are eaten uncooked. It may often be the case too that pork is so slightly measly, that the butcher does not know the disease is present. There can be no question about the identity of these two forms, the *tænia solium* in man and the *cysticerus cellulosæ* or measles in swine; for not only are their heads anatomically the same, but it had for a long time been noticed that in those places where measles in pork were abundant, there tænia was of most frequent occurrence, and that where the use of this flesh was forbidden among nations or sects, there tapeworm was scarcely ever found. All of this led to the belief, especially after the experiments performed in regard to the tæniæ and cystic worms of the lower animals, that the measles in flesh were the cause of tapeworm in man. To settle this point Küchenmeister fed a condemned criminal 3 days before his execution on raw measly pork, and on examination after death the young tapeworms were found attached to the walls of the intestine. One point, however, remained to be proved, viz.: that the eggs of the tapeworm produce the measles in swine. For this purpose experiments were undertaken by the Saxon government under the direction of Küchenmeister and other scientific men of Germany. Young and healthy pigs were kept confined separately, and to them were given the eggs of tapeworms. At various intervals afterward they were killed, and the encysted forms were found in myriads throughout the body. These experiments have been often repeated with the same success, so that the result is beyond question. To recapitulate: the tapeworm of the human intestine discharges millions of eggs, a single one of which need only reach maturity to produce millions more; therefore it is evident that the vast majority of these eggs perish undeveloped. These eggs must be devoured by some other host to reach their second or encysted stage. This stage is known as measles in swine. Measles being eaten by man in turn produce the tapeworm. These two forms never produce each other in the same individual. Various other tæniæ infest man in one of their stages, the most dangerous of which is the *echinococcus*, or encysted form of *E. hominis*. The cysts produced by this parasite are often as large as a man's head, causing great suffering and death. In Iceland every seventh person is thus afflicted. The explanation of this lies in the filthy habits of this people, and in the great number of dogs they keep, which assist in spreading the seeds of the disorder. Here the cysts or hydatids contain instead of one *scolex* or head innumerable embryonic forms, which of course increases the risk of infection. The mature tapeworm produced artificially

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consists of but 3 joints, and on this account has hitherto escaped notice. Even now it is not known whether man himself or dogs are the hosts of the mature helminth. Another remarkable species dwelling in the intestinal canal of man is the *bothriocephalus latus*, or broad tapeworm. This differs from the true tæniæ in the construction of its head and joints. The former is oval, flat, and instead of a coronet of hooks and round suckers, possesses 2 longitudinal sucking grooves on each lateral margin, by which it fixes itself; the latter are one-third of their width only in length, and the genital opening is found on the middle of each joint, instead of at the lateral margin, as in tæniæ proper, and occurs on the same surface throughout its whole length. They are sometimes as many as 2,000, but even then they do not make up a worm more than 20 feet long. Thus far this parasite has been found in man only in its mature state. Its geographical distribution is limited to Russia (including Poland), Switzerland, Italy, and the maritime districts of France and north Europe, and it most probably undergoes its transitional stage of development outside the human intestine in some of the mollusks, which form the food of man. A few other species of tapeworm infest mankind, but they are seldom met with, and will be found enumerated in the accompanying catalogue. The dog, from his domestic and omnivorous habits, is made the host of many of these entozoa, and does much to keep up their precarious existence. Without his aid the *tænia cænurus* would undoubtedly become extinct, and thus the sheep breeders would be rid of a disease which often proves so fatal to their flocks, viz., the staggers. This disease is caused by the presence in the brain of hydatids or cystic *cænuri*, which when eaten by butcher and sheep dogs are converted into the corresponding tænia, the embryos of which are in turn scattered broadcast over the pastures, where they find ready admission to the grazing herds. This too has been made the subject of searching investigation in Germany, and shepherds are taught to keep their dogs free from this tapeworm, by putting out of their reach the flesh of animals afflicted with the staggers. Sheep may often be kept healthy by keeping them from moist places, and from pastures, while the dew is still on the grass, for the proglottides seem to seek such localities, and the heat of the sun appears destructive to their vitality. Much more good may be effected by such preventive measures than by administering anthelmintics, or by attempting the removal of the cysts by the trephine or trochar. Did the raiser of swine, too, but know the natural history of the measles which infest his charge, this loathsome disease would be seldom met with. Very often immense droves of these creatures have to be slaughtered on its account, and such attacks always prove that the victims have lately been in the neighborhood of some person who has a *tænia solium*. Wild swine are never affected in this way, and it is only the filthy nature of its food which produces it in the domesticated animal. Occasionally this variety of *cysticercus* is found in the flesh of other animals eaten by man, as the ox, deer, and bear; but very seldom. No doubt a great deal of measly pork is sold both fresh and salted, and enough is eaten in an uncooked state in the form of sausages, raw pork, and the like, to account for the wide distribution of tæniæ. Dr. Weinland, in his recent essay on human *cestoidea* (Cambridge, 1858), divides the *tænioidea* into two classes: First, the *sclerolepidota*, or hard-shelled tapeworms, the embryos of which, developed in the warm-blooded vertebrata, become mature tæniæ only in the intestinal canal of carnivorous mammalia. Thus man obtains the *tænia solium* from swine; the dog the *T. serrata*, *T. cænurus*, and *T. echinococcus* from the rabbit, the sheep, and the ox respectively; the cat the *T. crassicollis* from the mouse, and so on. Second, the *malacolepidota*, or soft-shelled tapeworms, the eggs of which are to be hatched in the stomach of articulata and mollusks. The mature entozoa of this order inhabit the intestinal canal of such animals as prey upon the above, as fish, birds, and insectivorous mammalia.—*Trematoda*, *sterelmintha* (Owen), isolated flat worms. These entozoa are characterized by their flattened, more or less elongated shape, and by ventral sucking disks. The same individual possesses the organs of both sexes. Rudolphi divided them into different genera, according to the number of cup-like suckers present. This classification has been given up, inasmuch as the more important distinctions of structure did not correspond to the external markings; but many of the names have been retained. Thus the *distoma hepaticum*, or liver fluke, has 2 sucking disks. This, the best known of the trematode worms, resembles much a cucumber seed in form, and measures in length one inch, in width about half an inch. Its color is of a yellowish brown, probably owing to the bile in which it lives. In this class we first find evidence of an alimentary canal, in addition to the sexual organs, thus giving it a higher rank than the *cestoidea*. This consists of a triangular opening or mouth, which may be used either as a sucker or means of obtaining nutriment. From this arises the intestinal canal. An excretory system is also present. This fluke has been found only in a few well-authenticated cases in man. Its true home is in the gall ducts of sheep, and it is generally found in the same place in the human system. There are cases, however, on record in which it has been found seated beneath the skin, having made its way thither by boring into the epidermis. In the liver of the lower animals it works sad havoc in autumn and winter, causing a dilatation and catarrh of the gall ducts, and an interference with the hepatic function; by which, of course, the secretion of the bile is disturbed and changed. They may occur in such quantities as to stop up the cystic duct, and their eggs are deposited in vast numbers in the bile. The symptoms they create in man need not be stated here. The pas-

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sage of this worm by the stomach or intestines is the only proof we could have of its presence before death. The generation and development of these worms has been a subject of great interest to naturalists, since Steenstrup made them the object of investigation in illustrating his theory of alternation of generation. The eggs of the *distoma*, escaping from ciliated embryos, become converted into a nurse or grand-nurse while in the water. These nurses or *cercariæ* are supplied with organs of self-support, and were formerly looked upon as mature animals, but are merely cradles for young *distomata*, which are produced within their canal, or, where this is wanting, within the simple sac, from the germinal granules retained from the original embryo. This young brood possesses in some species tails by which they undertake wanderings on their own account, become attached to mollusks or like animals, and thus find their way into the intestine and liver of some larger animal. Another way exists by which they may reach the intestine; for the tailless brood have the power of encysting themselves while in the water, and may thus be borne about till they are swallowed by some of the herbivora. This is the general plan of development in all trematode worms, but it is not yet known what peculiar metamorphoses this entozoon undergoes. There can be little doubt, however, that sheep infect themselves by devouring snails which frequent the grass in moist meadow pastures, or by drinking ditch water. Whether "the rot" is actually caused by this parasite is not certain, but they are always found in this disease. Little benefit is to be derived from the use of anthelmintics, but a proper attention to these laws of prophylaxis will aid the farmer much in preserving his flocks in a healthy condition. The *distoma hæmatobium* forms a very common disease in man in Africa, according to Bilharz, who found it first in the blood of the portal and mesenteric veins. Their chief habitation, however, is the bladder and intestines, and when present in numbers they are very detrimental. In the bladder they fasten themselves to the mucous membrane, and produce patches of inflammation, exudation, and hemorrhage. The fungous excrescences they cause are pedunculated, and often of the size of a pea. Within them the animals may be found, and on their external surface the eggs. In the ureters the inflammation they create is sufficient to produce stricture, and consequent atrophy of the kidney. Several other species of trematode entozoa have been found both in man and herbivorous animals, but they can only be enumerated in this article. Some of them infest the eyes of animals, and are sometimes found in such prodigious quantities as to almost fill the cavity of the eyeball.—*Acanthocephala, sterelmintha*, hooked worms. This group of entozoa, which resembles the *nematoidea* in form and distinction of sex, approaches more nearly the *trematoda* in its digestive system. It includes some of the most noxious of the parasitic helminths, but none infest man. They are included under one genus, *echinorhynchus*, which is characterized by its retractile proboscis, armed with recurved spines. It is found in the intestines of the hog and other animals.—*Nematoidea, cœlelmintha* (Owen), or round worms. This class is made up of the round worms which inhabit the intestine, lungs, and kidneys of man and the lower animals, or else are enclosed within cysts in the muscular system or beneath the epidermis. They too undertake migrations and undergo transformations, but we are less acquainted with their development than with that of the first two classes; all that we know of them is, that we find sexually mature and embryonic forms, but to trace a connection between them, or to discover their mode of growth, has hitherto been impossible. They are distinguished from the *cestoidea* and *trematoda* by a more elaborate digestive apparatus, by a nervous system, and by individuality of sex. Most of the species are oviparous, and the development of their eggs has been lately made the study of helminthologists. The ova are enclosed in hard shells, within which under suitable conditions the embryo is further developed by segmentation, till it breaks from its habitation, and comes forth either a perfect worm, or in an intermediate form, in which it wanders into the tissues of man and other animals, where it may undergo the encysted stage, and finally on escaping become the mature individual, when it has found again a suitable habitation. The largest of this class is the *strongylus gigas*, which belongs to the dog and other animals, but which has been found at rare intervals in the human kidney. It is a long, cylindrical, red monster, with a mouth made up of 6 papillæ. The male, as usual in the *nematoidea*, is the smaller, measuring from 10 to 12 inches, while the female sometimes attains the length of 3 feet, and is half an inch in thickness. This sea serpent of the human entozoa seems really to cause very little trouble. Like the *ascaris*, its relative, its fine red color seems owing to a reddish oil secreted by the vaccuoles of the skin. Another species, *S. equinus*, is very common in the intestine of the horse, and *S. longiraginatus* has been found in the lungs and bronchial glands of man. The *ascarides* are very numerous, and inhabit the intestines of many animals. The *ascaris lumbricoides* is the largest which infests the human intestine. It is found all over the world, and prefers the lower part of the small intestine. It is of a pale, pinkish hue, cylindrical and elastic, has pointed extremities, and varies greatly in size according to age and sex. The male measures from 4 to 6, the female from 8 to 18 inches in length. The head is trilobulate with a constriction below the papillæ, which serve as sucking surfaces. The intestinal canal is a straight tube piercing the centre of the worm from end to end. They are very prolific, and as many as 64,000,000 ova have been found in one female. These eggs when immature are triangular and

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very irregular in shape, but when impregnated are enclosed in oval shells, within which the process of segmentation is carried on. Whether it is their nature first to go through a developmental stage outside of man, and to gain readmission in food or in drink, is not known. The great numbers in which they are sometimes found, even as many as 300 or 400, leads to the belief that they may under favorable circumstances reproduce themselves in the original host; and the wanderings which individuals make upward may be the promptings of a blind instinct to deposit their eggs in the stomach, where their shells may undergo the solvent action of the digestive process. Wherever an opening exists between the intestine and any cavity or organ of the body, it may prove a loophole for the passage of this active parasite, and in this way its presence in strange places, as the bladder or abdominal cavity, may be accounted for. At all events, it is impossible for it to make an opening through the intestine or any tissue of the body, for it is without the means of doing so. The presence of ascarides has been attributed to illness and bad flour and bread. They are most abundant in moist localities, as sea-coasts and river valleys, and they may gain admission to the intestines on raw fruit, or in mollusca and larvæ of insects, which abound in such places. Bad food or the want of food will undoubtedly cause their discharge, as well as illness, but only because they are starved out, and because bad food and sickness generate an unhealthy action in the intestine, which thus becomes disagreeable to them. So their discharge is more frequent in summer, but it is on account of the frequent diarrhœas which follow the eating of green fruits and vegetables, by which they become sickly and are expelled, and not because they are generated by such food of itself; for it must take a long time for them to reach maturity, and they are seldom seen before this age. All attempts to produce these worms in the lower animals by administering eggs have thus far failed. —The muscles of man are sometimes found after death to present a sanded appearance, which is caused by the presence of innumerable little cysts scattered throughout their substance, generally isolated but in immediate contiguity. These minute bodies when examined microscopically are found to contain immature worms coiled up in the narrowest compass. When set free they unfold themselves, and move about in a lively manner. They are cylindrical and tapering, and their name is *trichina spiralis*. They are also found in the muscular system of the hog. Now in the small intestine of man all the world over is often found a small thread-like worm coiled up or extended, which is the *tricocephalus dispar*. They sometimes occur by hundreds, and were formerly but erroneously supposed to be connected with the diarrhœa of typhoid fever. Recently helminthologists have thought they recognized sufficient resemblance between them and the encysted *trichinæ* above mentioned, to consider the one the undeveloped or embryonic stage of the other. This opinion is based on anatomical grounds, which need not be repeated here. The interesting discovery by Leidy of trichinous pork teaches us how, as we have shown in measles, man may infect himself with the *tricocephalus*. How he gets the *trichinæ* is not so easy to explain, as it is not known whether the embryo on emerging from the egg has the power of burrowing into the blood vessels. If the worm by wandering upward deposits its eggs in the stomach, we can readily see how the embryos, if they do possess this power, may spread themselves throughout the body.—One more of the human entozoa is sufficiently interesting to be mentioned here at length, viz.: the *filaria medinensis*, or Guinea thread worm. This is confined to certain localities in the tropical regions. It is seldom over 3 yards long, and is found of all lesser sizes according to its age. The male has not yet been described, for either its small size prevents detection, or else it never occurs in man. In shape the female resembles a flattened cord, one line in diameter. Its color is pale yellow, and it is viviparous. Its head is circular and armed with 4 straight, pointed spines, by which it probably penetrates the tissues. It inhabits the subcutaneous areolar tissue, and chiefly that of the ankles, feet, and legs; but it has also been found in the abdominal parietes and arms. It often proves an endemic, attacking certain regiments in armies and sparing others. It appears to follow the rainy seasons, and to occur mostly in low and marshy districts. There can be hardly any doubt that this animal is an inhabitant of wet places, and that man infects himself only by allowing it to come in contact with his skin. Those who take great precaution against wetting their feet, sleeping on the ground, and bathing in marshy pools, generally escape it. The worm may lie coiled up or extended at full length beneath the skin. As many as 50 individuals have been observed in one person, but usually one alone occurs. If superficial, its growth may be watched from day to day, and it has been seen to increase more than an inch in 24 hours. It often lies concealed for a long time, however, without causing any symptoms of its presence, and may thus be borne from one country to another by its host. When about to open externally, a little boil is found at some point on the skin, which either bursts or is opened, and the anterior end of the worm protrudes. It is removed by seizing this and making gentle traction. All that readily yields is wound about a compress, and bound down over the wound till the following day, when the same process is repeated till it is wholly extracted. Great care is taken not to break the worm, for serious results often follow such accidents. It is probable that the young or germs inhabit wet soils, and enter the tissues of other animals to attain their full development after being impregnated outside. The attempt of the mature female finally to escape would seem to imply

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that, its end being accomplished, it would return to its former home, and deposit its young, where new hosts may offer themselves for their reception.—We append a list of well authenticated helminths found in some stage in man. 1. CESTOIDEA: *tænia solium; T. e cysticerco tenuicolli; T. mediocanellata; T. nana; T. e echinococco altricipariente; T. e echinococco scoliciparíente; bothriocephalus latus.* 2. TREMATODA: *monostoma lentis; distoma hepaticum; D. lanceolatum; D. heterophyes; D. hæmatobium; D. ophthalmobium.* 3. TREMATOIDEA: *tricocephalus dispar; ozyuris vermicularis; ascaris lumbricoides; strongylus gigas; S. longivaginatus; ancylostomum duodenale; filaria lentis; F. medinensis.* Many other varieties of these 3 classes have been observed, but not enough is known of them as yet to raise them above the list of the strayed or the accidental, or to give them a place among the proper parasites of man.—The administration of drugs in the encysted stages of tapeworm would of course be useless, and their diagnosis is often a most difficult problem to the physician. The following remarks apply then only to the intestinal forms. Nothing should be done until the passage of joints gives the infallible sign of the presence of the worm. All statements of patients regarding their own symptoms must be received with much doubt. A long catalogue of fearful and frightful ills is ascribed to their presence, but probably in the majority of cases without any cause whatever. It is true that the worm feeds upon the nutriment of the patient, but this has not yet formed a part of his organization, and is not oxygenized. Whether epilepsy is ever caused by tapeworm is a matter of great doubt, and more valid proof is needed to show more than a coincidence between the presence of the two. Whenever a person harboring one of these becomes ill in any way, from any cause inexplicable, the parasite receives the entire blame. Some species cling more firmly than others, and are more difficult to dislodge. Of course, unless we obtain the head we fail, for the *scolex* may go on producing new colonies indefinitely. The only way to effect their removal is to render their habitation disagreeable to them. A long list of anthelmintics swells the works on materia medica, but the following are the only trustworthy remedies: the roots of the male fern, pomegranate bark, oil of turpentine, kousso, and pumpkin seeds, all of which should be employed in connection with a subsequent course of cathartic medicine. No remedies as yet discovered are of any avail in the treatment of the *trematoda*, and their presence can only be correctly diagnosticated when their passage into the outer world is observed. Among the *nematoidea*, the *oxyurides*, or pin worms, are the most troublesome, on account of the intolerable itching caused by their nightly wanderings outside the intestine. No treatment can wholly remove them, but cathartics and cold enemata are the best remedies. The administration of santonine or some of its compounds will be found to act as a true vermifuge in the treatment of ascarides.—The bibliography of helminthology has received many valuable additions within the last few years, since it has become a distinct science. For a more complete account of its progress than the nature of this article allows, the following books may be referred to: Rudolphi, *Entozoorum sive Vermium Intestinalium Historia Naturalis* (3 vols. 8vo., Amsterdam, 1808); Steenstrup, publications of Ray society, "Alternation of Generation" (8vo., London, 1845); Bremser, *Ueber lebende Würmer im lebenden Menschen* (4to., Vienna, 1819); Diesing, *Systema Helminthum* (2 vols. 8vo., Vienna, 1850); Dujardin, *Histoire naturelle des helminthes ou vers intestinaux* (8vo., Paris, 1844); Van Beneden, *Vers cestoides ou acotyles* (4to., Brussels, 1850); Leuckart, *Blasenbandwürmer und ihre Entwickelung* (4to., Giessen, 1856); Owen, "Lectures on Invertebrata" (8vo., London, 1843); Küchenmeister and Von Siebold, translated in Sydenham society publications (2 vols. 8vo., London, 1857); Leidy, "A Flora and Fauna within Living Animals," Smithsonian publications, vol. v. (4to., Washington, 1853); Weinland, "Human Cestoides" (8vo., Cambridge, 1858).

ENTRECASTEAUX, JOSEPH ANTOINE BRUNI D', a French navigator, born in Aix in 1739, died at sea near the island of Waigeoo, in the Pacific ocean; N. of New Guinea, July 20, 1793. He entered the naval service in 1754, gradually rose to the position of commandant of the French fleet in the East Indies (1786), and in 1787 he became governor of Mauritius and the Isle of Bourbon. In 1791 he was sent by the French government in search of La Pérouse, who had not been heard from since Feb. 1788. He failed in detecting any trace of him, but ascertained with great exactness the outlines of the E. coast of New Caledonia, W. and S. W. coast of New Holland, Tasmania, and various other coasts.

ENTRE DOURO E MINHO. See MINHO.

ENTRE RIOS, a state of the Argentine confederation, South America, deriving its name from its situation, between the rivers Uruguay and Parana, bounded N. by Corrientes, E. by Uruguay, S. by Buenos Ayres, and W. by Santa Fé and El Gran Chaco; area estimated at 32,000 sq. m., occupied by alternate tracts of prairie and swamp land, and mostly uncultivated; pop. in 1855, about 50,000. In the southern part is an extensive alluvial plain, subject to annual inundations. The climate is mild and healthy. Sudden changes of temperature never occur, and frost is almost unknown. Vast herds of horses and cattle roam over the prairies, and the exportation of hides, horns, tallow, and jerked beef is the chief source of the wealth of the state. Parana, Ybicuy, and Concepcion de la China are the principal towns.

ENVELOPE, a paper covering for a letter, introduced into general use in Great Britain soon after the passage of the act of parliament of Aug. 17, 1839, which provided for the payment of postage by weight instead of by the number

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of pieces of paper. In 1841 it was found that about half the correspondence passing through the post office of the United Kingdom was in envelopes; and in 1850 100 out of every 112 letters were thus protected. In the United States their adoption followed more slowly the similar change in postage introduced by the act of 1845; but for several years past they have been almost universally employed. For some time envelopes continued to be cut out and folded by hand, but the increasing demand led to the invention of exceedingly ingenious machines for furnishing them with extraordinary rapidity. First they were cut into form by chisels, the paper, roughly shaped, being held in a templet or mould of the proper pattern. The folding was then completed by hand with the use of a common bone folder. About 3,000 were as many as an expert person could thus prepare in a day. In 1845 Messrs. Edwin Hill and Warren De la Rue obtained in England a patent for an envelope machine, covering also the apparatus for cutting out the blanks. By this machine from 45 to 60 envelopes per minute are produced, all precisely alike, making in a day of 10 hours, with proper allowance for stoppage, from 27,000 to 30,000, of which not more than one in 2,000 is found to be badly folded. The blanks are cut into a lozenge shape by an instrument in character like a punch for cutting gun wads. It cuts out 250 blanks at once, and passes for succeeding cuts in a diagonal direction across the paper, so as to reduce the waste to the least possible amount. The seal upon the flap is next stamped at the embossing press, and the gum is applied by hand to this flap. A boy then places them one by one upon a small table forming the moulding frame attached to the machine, the interior of which is of the size and shape of the envelope when finished. A plunger fitted to this is brought down by a revolving cam and presses the paper into the mould, causing the 4 flaps to stand up at right angles to the central portion of the paper. The plunger is so made in parts, and these are so connected with the movements of the cam, that the portions covering the two ends of the envelope first rise up, and at the same time two triangular folders, one at each end, turn over and press down the end flaps, one of them a little in advance of the other. Another portion of the apparatus now applies a line of gum on the two end flaps, as they are thus held down. The side portions of the plunger then rise up, and the side folders turn the long flaps over, one a little ahead of the other. All 4 folders then open; a finger-shaped apparatus advances from the side, the points of the fingers tipped with caoutchouc, and the envelope is lifted up with the frame against them, then withdrawn to one side, and conveyed to a revolving belt, by which it is carried under a roller, and finally deposited in a receptacle on one side of the machine. The apparatus is so arranged as to admit of its being adjusted for envelopes of different sizes. It is fed at the rate of about one every second, and in case of omission to furnish an envelope at every revolution of the main cam, the attendant must instantly move a stop which lifts up the gummer and prevents the application of gum to the table where the envelope should be, as also the movement of the fingers, which would otherwise derange the envelope last deposited.—Another remarkable machine for this simple work of folding and gumming the small pieces of paper for envelopes, constructed by M. Remond, of Birmingham, was shown at the great exhibition of 1851. To this the blanks are supplied by means of a hollow arm, which as it moves forward is exhausted of air, and in this condition coming over the pile of prepared blanks, one of them at the top is caused by the atmospheric pressure to adhere to the double tubular end, and is thus carried along till the tube becoming filled with air drops the blank upon a spot where by the descent of a dabber it is pressed against a sponge saturated with gum from the receptacles with which it is connected. The gum being thus laid exactly where it is required, and the stamping or embossing being at the same time effected, the paper is next pressed into the hollow mould, and its flaps stand up as in the other machine; the plunger retreats, and a puff of air blown successively through each of the 4 sides, which are perforated to admit it, turns these down, and the re-descent of the plunger secures them in their places. They are finally taken out by hand, placed in a pile, and slightly pressed.—In the United States, hand-made envelopes were first furnished to the trade by Messrs. Bell and Gould and Mr. George F. Nesbitt of New York. The former house afterward obtained a machine, contrived by Mr. Gerard Sickles, which is understood to have done good service, though since surpassed by others of later invention. Mr. Nesbitt was not long in securing another, which in general plan resembled that of De la Rue, though much more simple and perfect. In his establishment he employs about 8 machines, the capacity of each of which is about 30,000 envelopes per day. The machines occupy but little room, 5 of them standing as they are worked in a space of about 18 feet in length and less than 4 feet in breadth. Each one is in an iron frame, about 5 feet high, 2 feet from side to side, and 16 inches from front to back. The feeding shelf projects in front about 2 feet more. The power is applied to a driving pulley upon one end of a horizontal axis or shaft along the top of the frame. The pulley is put in gear by placing the foot upon a treadle at the base, and is thrown out on removing the foot. In the middle of the axis is a crank giving 9 inches stroke and carrying the vertically moving plunger. Near the pulley is a cam on the shaft for the movements connected with the gumming, and at the other end of the axis is the crank for working the various other movements of the machine. The machines are worked by females, one to each. As the foot is placed upon the treadle, a blank cut by the usual method is laid carelessly upon the feeding shelf. It is imme-

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diately taken along and worked into its exact place, and a second is started before the first has reached the centre under the plunger. While this is coming down, a pair of gummers, at an obtuse angle to each other, having received their supplies of gum from the receptacle with which they are connected, are brought over the wide back flap and dab a little gum upon the edges of this. The plunger immediately follows, and carries the blank down through the opening, which it exactly fits, leaving the flaps standing up. The plunger rises, and the two end flaps are pushed over in turn, and upon them the back flap, fastening all three together. The last shutter closes over the front flap, the bottom of the mould falls back upon its hinges, and the envelope falls through into a tin slide, down which it slips into an upright tin box placed to receive them. This box makes a quarter revolution on its axis with every 25 envelopes, and these are consequently arranged in the box in piles of 25, crossing each other, ready for counting and boxing. The new style of envelope lately introduced by Mr. Nesbitt, having black lines on the inner side of the back flap, to serve as a guide in writing the address before the letter is put in, is intended to be prepared in the machine by the introduction of some additional parts. Most of the commercial "lined envelopes" are prepared by Mr. Nesbitt. They are mostly very large-sized envelopes of paper with a bluish tinge, secured before cutting to a backing of cotton, or as it is called, muslin. The whole is then made up, usually by hand. These envelopes are used for protecting money and valuable papers transmitted in commercial transactions. Messrs. McSpedon and Baker are also large manufacturers, producing probably 25,000,000 envelopes annually; and J. Q. Preble probably a still larger number, using machines of several kinds. Messrs. Hartshorn and Trumbull, of Worcester, Mass., employ about 17 machines, the invention of Dr. R. L. Howes, of Worcester, the capacity of each of which is about 10,000 a day. They employ steam power, and produce about 45,000,000 envelopes annually. In these machines the envelopes placed in a pile are brought up from beneath the table by a counterpoise, and the top one is immediately taken up by the gummer, which comes down upon it, and leaves the required quantity of gum in the right place to secure the end and back flap—the front one, as in all machines, being first gummed by hand and dried. The paper dropped by the gummer is then taken by a carriage under a double plunger, the outer portion of which forces it down into the mould, and an inner part follows, turning over the flaps in succession. After the plunger rises the bottom of the mould is pressed up by a spring, and the envelope brought again to the surface is taken by the same carriage back, and delivered upon a slide which drops it into a receiver.

ENVERMEU, a small town of France, in the department of Seine-Inférieure, Normandy; pop. about 1,500. It is situated within a few miles of Dieppe, and contains the site of an ancient Frankish cemetery, explored from 1849 to 1856, by the abbé Jean Benoit Désiré Cochet. His researches have proved very valuable to archæological science. The greater part of the graves had been violated at some remote epoch, but a few of them remain intact. One of the most remarkable of these is the grave of a young person, with ear rings of bronze, with oval pendants of gold. Close to the ear rings were 25 to 30 threads of gold, which (the greater part still remaining interlaced) appeared to have belonged to a woven band, or fillet, which time had entirely destroyed. Similar relics were found at Kertch in 1838, and such interments with ornaments were common among the ancient Greeks and Etruscans. One of the graves in the Saxon cemetery at Chessell, in the isle of Wight, opened in 1855 by Mr. George Hillier, contained similar filaments of gold. Among the relics discovered at Envermeu are swords, sabres, bronze buckles, a Gaulish coin or rather ingot of gold, which presented on the reverse an ill-formed miniature horse (supposed to belong to the era of 270 to 100 B. C.), bronze ear rings, necklaces composed of glass beads, iron axes (*francisca*), accompanied by iron lances (*framea*), iron spurs, arrow points, iron daggers ornamented at the point with a plate of bronze and flanked by small knives, elegant bronze purse clasps, &c. The cemetery seems to have been of a circular form, and was probably once covered by a tumulus, long since removed by the operations of agriculture. The abbé Cochet (born near Havre, March 7, 1812) is one of the most active French archæologists of the present day. Among his latest works on his researches in Normandy are: *La Normandie souterraine, ou notices sur des cimetières Romains et Francs explorés en Normandie* (Rouen, 1854, with plates), and *Sépultures Gauloises, Romaines, Franques, et Normandes* (Dieppe, 1857).

ENZINA, or Encina, Juan de la, founder of the secular theatre in Spain, born in 1468 or 1469, died in Salamanca in 1534. He was educated at the university of Salamanca, spent some time in the household of the first duke of Alva, afterward went to Rome, where he became a priest, and, from his skill in music, chapel master of Leo X. In 1519 he made a pilgrimage to the Holy Land. At least 6 editions of his collected works, divided into 4 parts, were published from 1496 to 1516, containing lyrical poetry, songs, and several descriptive poems. But his most important works are his dramatic compositions, which he called *Representaciones*. They are in the nature of eclogues, interspersed with songs, but deficient in dramatic structure. They were first represented before the duke of Alva, and in 1492 companies began to represent them publicly.

ENZIO, a natural son of Frederic II., emperor of Germany, born in 1224 or 1225, died in Bologna, March 14 or 15, 1272. He was handsome, accomplished, and chivalric, and took a distinguished part in the contests of his father with

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the Guelphs. As early as 1237 he accompanied him to the battle of Corte Nuova. About 2 years afterward he married Adelasia, marchioness of Massa, the widow of Waldo Visconti, and the heiress of important possessions in Italy. On this occasion he was created king of Sardinia; but it was only a nominal dignity. A more substantial one conferred on him by the emperor was that of governor-general of Lombardy and of commander of the German troops against the Milanese. Gregory IX. excommunicated Frederic, Nov. 11, 1239; the pope's anger increased the ardor of Enzio, and he conquered for his father many towns in Umbria. As commander of the emperor's naval force in 1241, he defeated, in conjunction with the Pisan fleet, the Genoese in the vicinity of Leghorn, near the island of Meloria (May 3), after a protracted engagement. A great number of prelates were on board of the Genoese galleys, about to attend, in spite of the emperor's remonstrance, a council convoked at Rome by Gregory. All these prelates, abont 100 archbishops and bishops and 3 legates of the pope, were captured; the total number of prisoners was estimated at 4,000. The booty taken from the Genoese comprised a large amount of money, and in token of this success, the prelates were removed to prison in chains made of silver. After this and other victories over the Guelphs, the Ghibellines were defeated, May 26, 1249, in the bloody battle on the Fossalta. Enzio being made prisoner, the Bolognese condemned him to perpetual imprisonment, and refnsed to release him, although the emperor was ready to pay any amount of ransom for his son. He continued in prison for 24 years, surviving all the sons and grandsons of Frederic, who all met with a violent death. Stories were circulated about the attempts of his friends to effect his escape by concealing him in a barrel of wine which was supplied for his table; it was also said that he had been imprisoned in an iron cage, bnt although strictly guarded, he seems to have been treated with kindness.

EOCENE (Gr. *ως*, dawn, and *καινος*, recent), the lowest gronp of the tertiary formation, so named by Sir Charles Lyell in making the divisions of this series, from the fact that among the fossil shells with which the strata abound, a few are met with of species identical with those now living; and as all those in the next older formation (the secondary) are extinct, the oldest tertiary strata may be regarded as indicating the dawn of the existing state of the testaceous fauna. The division being based on the proportion of recent species of shells to those which are extinct, which proportion in the original arrangement was determined from the examination of 1,238 species to be about 3½ per cent., the upper boundary line of the group cannot be determinately fixed. New sets of strata are occasionally met with, which may be referred either to the eocene or to the miocene which succeeds it, a group which is characterized by containing a much larger number of existing species. The formation is largely represented in the London and Paris basins, the numerous fossils of which afforded the means of establishing this classification, and of subdividing the group into 3 divisions called the upper, middle, and lower eocene. It is recognized near the southern coast of the United States, extending from Delaware south, the more recent members of the tertiary formation commonly intervening between it and the coast line. The locality best known and studied is at Claiborne, Ala., where no less than 400 species of marine shells, with many echinoderms and teeth of fish, are found in one member of the group. It is also met with in Nebraska, and in other parts of the valley of the Mississippi. The strata included in this division are sands, clays, marls, gypsum, sandstones, limestones, brown coal; indeed, all the varieties of sedimentary rocks, &c.

ÉON DE BEAUMONT, Charles Geneviève Louis Auguste André Timothée d', commonly called the chevalier d'Éon, a French diplomatist, who owes his notoriety to donbts which long existed as to his sex, born in Tonnerre, Burgundy, Oct. 5, 1728, died in London, May 21, 1810. He was of good family, was well educated, became a doctor of canon and civil law, and an advocate before the parliament of Paris, and at the outset of his career applied himself with some success to literature. In 1755 Lonis XV. employed him in a delicate diplomatic mission to Russia in company with the chevalier Donglas. Favored by a beardless face, he assumed the dress of a woman, and blending a woman's tact with a politician's cnnning, gained the good graces of the empress Elizabeth, became her reader, and having bent her mind to the wishes of the French court, went back to Paris to announce his success. He immediately revisited St. Petersburg in male attire, passed himself upon Elizabeth as the brother of her former favorite, was again successful in his negotiations, and on his way back to France appeared as envoy at Vienna. Having previously held a commission in the army, he was promoted to a captaincy of dragoons in 1758, served with the forces on the Rhine, and acted as aide-de-camp to Marshal de Broglie during the campaign of 1762. He was then secretary of embassy, and afterward minister plenipotentiary, at London; but being superseded in 1763 by the count de Guerchy, and mortified moreover by being named secretary to his successor, he revenged himself by publishing a complete account of all the negotiations in which he had been engaged, exposed many secrets of the French conrt, and reflected with equal severity upon friends and enemies. Among the victims of his slander was De Guerchy, who consequently brought an action in the conrt of king's bench, in which D'Éon was convicted of libel in July, 1764, and was finally outlawed. Meanwhile he caused De Guerchy to be arrested on a charge of an attempt to poison him, but the affair ended in nothing. He continued to reside in England, subsisting for a time

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by borrowing and various expedients, and afterward on a pension which Louis XV., notwithstanding his misconduct, allowed him for his secret services both in England and Russia, and, after the return of the count de Guerchy to France, acting as the representative of the court of Versailles, though not officially recognized as such. About 1763 rumors respecting his sex, which received color from his adventure at St. Petersburg, his appearance, his manners, and still more from the reports spread by his enemy De Guerchy, became common topics of conversation in the British capital; bets to a large amount were laid that he was a woman, and a wager of this sort became matter for a lawsuit before Lord Mansfield, in which the plaintiff, having brought witnesses to swear that D'Éon was a female, obtained a verdict for £700. In 1777 he went to Versailles, where Louis XVI., for reasons which have never been made known, forced him to exchange his dragoon's uniform for a woman's dress. He returned to England in this garb to collect his effects, and while there was placed on the list of *émigrés* by the revolutionary tribunal established during his absence. He supported himself in London by the sale of his library, by giving exhibitions of his skill in fencing with the famous Mons. St. George and Mr. Angelo, and by a pension from George III. He made one more visit to his native country, and under the name of Madame d'Éon petitioned the national assembly for leave to serve in the army; but obtaining nothing but applause by his request, he passed the rest of his days in poverty in England, retaining till his death, either through habit or for convenience, the garb which had been forced upon him 33 years before. A post mortem examination left no doubt of his being a man. He wrote a number of historical, political, and other works, filling 13 vols. 8vo.

EOS. See AURORA.

EÖTVÖS, JÓZSEF, baron, a Hungarian author and statesman, born in Buda, Sept. 3, 1813. His education was completed at the university of Pesth, and at the age of 17 he commenced his literary career by a translation of Goethe's *Götz von Berlichingen*. This was followed by two original comedies and a tragedy. In 1836 he travelled through Germany, Switzerland, France, and Great Britain. In 1838 he became the editor of the *Budapesti Arvizkönyv*, a work in which the most eminent Hungarian men of letters took a part. He contributed to it a novel entitled the "Carthusian," which made him at once the favorite of the Hungarian public. A pamphlet issued by him on prison reform produced a deep impression. His eloquent defence of the "Emancipation of the Jews" was still more remarkable. In the great controversy about Kossuth's *Pesti Hirlap*, Eötvös espoused his cause, and published a pamphlet in 1841 defending him against the conservative leader Széchényi. As one of the leaders of the opposition in the upper house of the Hungarian diet, Eötvös achieved a distinguished position. His readiness in debate, his fine presence, his literary attainments, his rank, all combined to give him great influence in the senate and in Hungarian society. But whatever may have been his merit as an orator and a politician, it was eclipsed by his fame as a novelist. The financial crisis of 1841 having deprived his family of the greater part of their fortune, he resorted to writing as a means of support, and began to publish a tale in numbers, under the title of *A Falu Jegyzője* ("The Village Notary"), in which he boldly exposed the abuses connected with the rule of the nobles in the counties. This novel had a marvellous success. A second edition appeared at Pesth in 1851, and a translation was published in England with a preface by Mr. F. Pulszky, to whom the work was originally dedicated. In 1847 he produced a new novel on the revolt of the peasantry in 1514, entitled *Magyarország* 1514-*ben* ("Hungary in 1514"). During this time he also exerted an influence through the newspaper press. His articles in the *Pesti Hirlap*, especially on centralization, of which he became the champion, while Kossuth defended the autonomy of the counties, were collected in 1846 in a volume at Leipsic under the title of "Reform." After the outbreak of 1848 Eötvös was appointed minister of public instruction under the Batthyany administration. He brought forward a comprehensive measure for the improvement of education, which was strenuously opposed upon sectarian grounds, but was warmly supported by Kossuth and adopted by the diet. Eötvös, however, withdrew from the cabinet on occasion of the assassination of Count Lamberg, and retired to Munich until 1851, when he returned to his native country. His most important and recent work is on the "Influence of the Leading Ideas of the 19th Century on the State" (2 vols., 1851 and 1854, Hungarian and German by the author), in which he expresses his confidence in the faithfulness of the age to humanitarian ideas, notwithstanding its utilitarianism.

EPACT (Gr. ἐπακτός, added), a number introduced into the Gregorian calendar, intended to express the moon's age (in days) on Jan. 1, and thus to determine its age on March 21. Easter Sunday was appointed by the council of Nice to be the first Sunday after the first full moon following the vernal equinox. But, in the church, this Sunday is found by a formula which is not strictly correct, so that Easter is sometimes on a different Sunday from what the direction of the council of Nice would lead to, if the equinox and full moon were sought by astronomical tables. The epact usually gives the moon's age one or two days too great. To find the epact: From 11 times the golden number subtract 10, and divide by 30; the remainder is the epact if the date is in the 17th century. For the 18th and 19th centuries subtract one from this remainder; for the 20th and 21st subtract 2. Subtract the epact from 24 (or, if it is a larger number than 24, from 54), and the remainder will show the number of days from the 21st of March to the next ecclesiastical (not

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actual) full moon; and the following Sunday (discovered by the dominical letter) will be Easter Sunday.

EPAMINONDAS, a Theban general and statesman, born in the last quarter of the 5th century B. C., died on the battle field of Mantinea in 362. He was the son of Polymnis, of a distinguished though rather poor Theban family, reckoned among those that were believed to have sprung from the dragon's teeth sown by Cadmus. Endowed with rare gifts and perseverance, he acquired not only that bodily development and military skill which were regarded as essential in Theban education, but also those accomplishments which belonged to the cultivated society of Athens, but were little cared for in the home of Pindar. He schooled his higher faculties by diligent study and intercourse with philosophers, one of whom, the Pythagorean Lysis, a Tarentine exile who closed his days in Thebes, he revered as a father. But philosophy with Epaminondas was not only a speculative study, he modelled his life according to it. Self-possessed, modest, indifferent to display, he despised riches, lived poor when at the height of power, and was a strict observer of truth, though often acting as a diplomatist. With Pelopidas, a man of congenial patriotism, he was early connected by the ties of tried friendship, though the date of the battle in which he saved the life of his friend cannot be fixed. When Pelopidas, after the treacherous occupation of the Cadmea, the citadel of Thebes, by the Spartan general Phœbidas, and the execution of the leader of the patriotic party, Ismenias, conspired with a number of fugitives against the tyranny of Leontiades and his colleagues the polemarchs, Epaminondas tried to dissuade his friends from their bloody attempt; but when the first deed of deliverance was done (379), and the contest transferred from the houses of Archias and Leontiades to the open market place, he immediately joined the exiles in arms and incited the citizens to storm the Cadmea. But the commander of the Spartan garrison evacuated the citadel on capitulation. This revolution opened the political career of Epaminondas; and though he is scarcely mentioned in the following period of 7 years, during which the military strength and political influence of Thebes were gradually developed, the great trusts with which he was honored in 371, both as a diplomatist and as a general, prove that his services to his country were highly appreciated. At the great congress held that year in Sparta, for the purpose of regulating the affairs of Greece, he defended the rights of Thebes and its ascendency in Bœotia to their utmost extent, insisting on taking the oath of the new treaty not for Thebes separately, but for that city as president of the Bœotian confederation. When Agesilaus, the energetic king of Sparta, arose in defence of the autonomy of the Bœotian cities, Epaminondas claimed the same for the townships of Laconia. The Thebans were excluded from the treaty, and war speedily commenced. Twenty days after the debate at Sparta the contending armies met at Leuctra. Cleombrotus, the colleague of Agesilaus, commanded the Spartans and their allies, Epaminondas was Bœotarch, and Pelopidas led the sacred band, lately organized and already distinguished. Departing from the usual habit of drawing up the armies in line for a general engagement, Epaminondas, whose numbers were inferior to those of his adversary, arrayed his best troops on his left wing to the depth of 50 shields, with the sacred band in front, advanced *en échelon*, keeping his right and centre a little to the rear, and attacked the Spartan right, where Cleombrotus and his chief officers were stationed. The shock was terrible, and after a short struggle the Thebans gained a decisive victory. Four hundred Spartans with their king, and 1,000 other Lacedæmonians, were among the dead. The whole of Greece, including Thebes, was surprised by this issue, so fatal to the might and glory of Sparta, though she still obeyed her laws, mourning not the victims but the survivors of Leuctra. Epaminondas pursued and strengthened his success by promoting the union of Arcadia and the foundation of Megalopolis, as its centre, against Sparta, and in 369 invaded the Peloponnesus together with some other Theban commanders. As their term of service drew to a close, he and Pelopidas persuaded their colleagues to continue the campaign, and to penetrate into the heart of Laconia. This province was now ravaged; Sparta itself barely escaped being taken; Messenia, its oppressed dependency, was restored to liberty, with a new capital, Messene, about the site of the ancient Ithome. An army from Athens, which had marched to assist Sparta, failed to check the return of the victorious Thebans through the isthmus. This being achieved, Epaminondas appeared before the tribunal of Thebes to answer for retaining his office beyond the legal time, and was acquitted amid the acclamations of the people. In the spring of the following year he again penetrated into the Peloponnesus, but on his return failed in an attempt on Corinth, being repulsed by the Athenians. He subsequently accompanied the army sent to Thessaly to rescue Pelopidas, who had fallen into the hands of Alexander, the tyrant of Pheræ. This expedition failed, but Epaminondas saved the army, and having been made commander of a new expedition for the same purpose (367), succeeded in delivering his friend without striking a blow. His influence at home, however, often attacked by enemies, was not always strong enough to moderate the aggressive spirit of his state, which he had raised to the leadership of Greece. Strengthened by a navy and an alliance with Persia, the former the work of Epaminondas, the latter of Pelopidas; the Thebans oppressed their neighbors of Thessaly, their confederates of Bœotia, and their allies of Arcadia, and evinced not only an overbearing spirit at every international complication,

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but also wanton cruelty in the destruction of the revolted Orchomenus in Arcadia. The consequence was a defection of nearly all the Arcadians, and a strong southern coalition against Thebes. Rapid and decisive action alone could save the supremacy of that state, and Epaminondas, therefore, again invaded the Peloponnesus at the head of an imposing army of Bœotians, Eubœans, Thessalians, and Locrians, which was soon joined by troops from Sicyon, Tegea, Megalopolis, Messenia, and Argos. The enemy concentrated his force at Mantinea. This was composed mainly of Achæans, Eleans, and Arcadians, while the old Agesilaus was approaching from Sparta, and the Athenian contingent was expected. Having vainly tried to provoke the allies to action before the arrival of the Spartans and Athenians, Epaminondas, aware of the circuitous route of Agesilaus, made a rapid night march from Tegea to surprise Sparta, which was saved, however, by Agesilaus being in time apprised of the danger, and by the admirable bravery of his son Archidamus and some other youths. Epaminondas now turned to surprise Mantinea while the enemy marched to the rescue of Sparta, but the arrival of the Athenians frustrated this attempt also. He finally determined on a pitched battle, which was fought on the plain between Mantinea and Tegea (362). The plan of the Theban general was similar to that adopted at Leuctra, and the issue would probably have been the same, had not his advance been interrupted by a javelin wound. He fell with the point of the broken spear sticking in his breast. He was still alive, but the extraction of the spear head would have terminated his pain with his life. Having been assured that his shield was not lost and that the Thebans were victorious, he inquired for two of his generals, but was told that they were dead. "Then let Thebes make peace with the enemy," said he, and drew out the weapon with his own hand. In reply to his friends, who regretted that he died childless, he said: "I leave two fair daughters, Leuctra and Mantinea." Epaminondas ranks among the greatest men of Greece, and is described by Nepos, in accordance with the concurring testimonies of the Greek historians, as a man adorned with every virtue and stained by no vice.

EPANOMERIA, a remarkable town in the island of Santorin, the ancient Thera, in the Grecian archipelago. It is situated on the face and edges of a tall cliff at the extremity of a promontory on the N. W. end of the island. The houses, many of which are excavated from the rock, are placed one above another, 15 or 20 deep, the lowest being 400 feet above the water. They are approached by means of a winding road and staircases cut in the cliff, and reaching from the base to the summit. Viewed from the sea, nothing can be more striking than the appearance of this town, with its dwellings high above the masts of the largest ships, or perched on the edges of frightful precipices. On the summit the scene is scarcely less singular, the road there in many places passing over habitations the existence of which is denoted only by chimneys jutting up on each side.

EPAULETTE (Fr. *épaule*, shoulder), an ornamental badge, or mark of distinction, worn on the shoulder by military men. It originated under Louis XIV., from the ribbon which held the sword belt in place on the shoulder. Epaulettes are worn either on one shoulder or both, by both naval and military officers, and are varied to denote distinctions of rank.

ÉPÉE, Charles Michel, abbé de l', an instructor of the deaf and dumb, born at Versailles, France, Nov. 5, 1712, died Dec. 23, 1789. On arriving at manhood he commenced the study of theology, and gave in his adhesion to the doctrines of the Jansenists, on which account his bishop refused him ordination, unless he would sign a certain formula of doctrine. This he would not consent to do, and though subsequently admitted to deacon's orders, he was told that he need not aspire to any higher ordination. Full of grief at this decision, he became a student of law and was admitted to the bar; but at this juncture, his old friend, M. de Bossuet, a nephew of the great pulpit orator, having been promoted to the see of Troyes, offered him a canonry in his cathedral, and admitted him to priest's orders. He fulfilled his new duties with zeal and propriety; but hardly had he established himself in what he hoped was his life-work, before his kind patron died, and his place was filled by a Jesuit bishop, through whose influence he was deposed from the priesthood. It was while depressed by this sudden change in his prospects that De l'Épée's attention was first called to the unfortunate class to whose welfare he subsequently devoted his life. Calling one day upon a neighbor, he found that she had two daughters who were deaf and dumb, that a benevolent priest had endeavored to convey some ideas to them by pictures, but that he was dead, and there was no one who could teach them. Touched by their misfortune, he resolved to undertake their instruction. Up to this time the only successful attempts at instructing the deaf and dumb had been by the process of articulation. A few persons, less than 50 in all, in a period of 270 years, had been with infinite pains taught to pronounce words indifferently well; in most cases their understanding of the meaning of words thus communicated was imperfect; but it was reserved for De l'Épée to inaugurate the system of instruction by natural signs. Pereira, Wallis, Dalgarno, Bonet, and Ponce had instructed a few sons of rich men, and men of high rank, but he sought only the improvement of those who could not pay for instruction. When he commenced his labors as a teacher of deaf mutes, De l'Épée was not aware that any works had been written upon the subject. Some time after he accidentally obtained a copy of Bonet's *Reduccion de las letras* in Spanish, and learned that language in order to read it. But the idea of using the natural signs and gestures to communicate in-

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formation to the deaf mute was unquestionably original with him. It was the application of a principle which, in general terms, he had acquired in youth, that ideas were substantive, and had no necessary connection with words written or spoken; to find the means of presenting ideas to the mind of the deaf mute, without the intervention of words, was the problem which De l'Epée set himself to solve, and in the gestures and signs by which mutes were accustomed to convey their thoughts and wishes to others, he found the key to its solution. To extend, amplify, and systematize this language of signs, was thenceforth his work, and it was well done. Others have since introduced many and important improvements, but the foundation was laid and the walls of the superstructure reared by him. From 1755, the date of his first establishment of a school for deaf mutes, till his death in 1789, a period of 34 years, he supported the school entirely at his own expense, receiving no remuneration from either public or private sources. As his school soon became large, and his patrimony was but small, he was compelled to exercise the most rigid economy. Even in his 76th year he insisted on depriving himself of fire in his own room in order to sustain his school. But though thus prudent and economical in his own expenditure, he would not receive the children of those who were able to remunerate him, nor would he accept even from crowned heads any pension, present, or gratuity. When the ambassador of Catharine II. intimated to him that his royal mistress desired to make him some valuable gifts for his service to the unfortunate, he asked, as a special favor, that she would send him some ignorant deaf and dumb child from her dominions whom he might educate. To Joseph II. of Austria, who pressed him to receive the annual revenues of one of his estates, he replied by the request that he would send him some person whom he might instruct in the art of teaching the deaf and dumb, and who might then establish an institution for them in Austria. From the first his methods of instruction were public; in this he was imitated only by Heinicke, a man of like spirit. Wallis, Pereira, and Braidwood all kept their processes secret, designing to leave them as heirlooms to their families. A bronze statue has been erected to the memory of De l'Épée at Versailles, and a bass-relief placed in the church of St. Sulpice, by citizens of Sweden. In the imperial institute of the deaf and dumb at Paris, a tablet commemorates his worth and his noble deeds. In 1855 the centennial anniversary of the establishment of his school for deaf mutes was celebrated at Paris, and was largely attended by delegations from institutions for the deaf and dumb in other countries of Europe.

EPERIES, a town of northern Hungary, on the Tarcza, capital of the county of Sáros, in the district of Kaschau; pop. about 9,000. It is one of the most ancient and interesting, and, after Kaschau, the most beautiful of the towns of Upper Hungary. In 1687 the imperial general Caraffa established here the famous bloody tribunal which caused the torturing and execution of a very large number of patriots, especially Protestants. The executions took place on the public square before the windows of the general, and death on the gallows was regarded as comparatively mild and merciful. In 1848 and 1849 Eperies was successively in the possession of the revolutionists, of the Austrians, and of the Russians.

EPERNAY, an ancient French town, capital of the arrondissement of the same name, in the department of Marne, situated in a fertile valley on the left bank of the river Marne, 20 m. from Châlons, on the railway from Paris to Strasbourg; pop. in 1856, 9,182. It presents a lively, bustling appearance, and has a number of manufactories, a theatre, a public library of 10,000 volumes, and a fine city hall. It is the great entrepot of the trade in Champagne wine.

EPHAH, one of the measures in use among the Hebrews, both for things dry and liquid. As a liquid measure, it was the same as the bath or firkin, and contained about 7⅓ gallons. As a dry or hollow measure, it was one-tenth of the homer, and was equal to 10 omers or gomers. It held a little more than 1½ bushels of our measure. There was, however, a difference between the measures, weights, &c., of the Hebrews before and after the captivity.

EPHEMERA (Gr. *ἐφήμερος*, that which lasts a day), the name given by Linnæus to a genus of insects of the order *neuroptera*, so named from their appearing in the winged state only for the short period of a day, though in the larva and nymph states they are said to live beneath the surface of the water for 2 or 3 years. Appearing above this, in the air, generally toward the evening in fine summer weather, they provide for the continuation of their race and die. Though but frail and delicate insects, they have been found, in certain districts in France, covering the ground in such enormous numbers that they have been collected by cart loads for manure. One species, the *ephemera albi pennis*, or white-winged, is sometimes seen in such quantities by the banks of rivers, that they whiten the air and the ground like drifting snow.

EPHESIANS, EPISTLE TO THE, one of the canonical books of the New Testament, written by St. Paul during the earlier part of his imprisonment in Rome (about A. D. 62), and commonly believed to have been addressed to the church at Ephesus, though Marcion, Grotius, and others have maintained that it is the epistle to the church in Laodicea which is usually supposed to have been lost, and Archbishop Usher that it was a circular letter intended for no church in particular. This epistle is written, says Macknight, as it were in a rapture, and expresses in an elevated style the fulness of the apostle's joy on learning the steadfast faith of the church which he had founded. Without presenting any strictly marked divisions, it treats especially of the mystery and blessedness

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of the scheme of redemption, and closes with exhortations to various duties, to fortitude, watchfulness, and prayer.

EPHESUS, one of the 12 Ionian cities of Asia Minor, situated on the western coast, near the mouth of the Caystrus. According to the legends it was founded by the Amazons, when they descended from the banks of the Thermodon to combat Theseus. It was inhabited by the Carians and Leleges, who were expelled and succeeded by Ionian colonies under Androclus, son of Codrus, the last king of Athens. The Greek genius of the new inhabitants, the mildness of the climate, the richness of the soil, the favorable location for commerce, and above all the worship of Diana, which was said to have been instituted there by the Amazons, made this city the most important metropolis of western Asia. It was governed by a senate and by deputies, and maintained its independence till the reign of Crœsus of Lydia, who attached it to his kingdom. It then passed successively under the power of Persia, Macedon, and Rome. The Romans governed it as the capital of western Asia, by their proconsuls, and made it the centre of a great commerce. It was called by Pliny "the light of Asia." It declined early in the middle ages, and at present its site is covered with rubbish and vegetation, and there remains only the remembrance of its past history and of its magnificent temple of Diana. Ephesus was one of the cities which claimed the honor of having given birth to Homer. It was the birthplace of the famous painter Parrhasius, and perhaps of Apelles, of the philosophers Heraclitus and Hermodorus, and of the poet Hipponax, the inventor of the parody. But its chief glory and ornament was its magnificent temple, soon after the destruction of which by the Goths, the city itself went to decay. The first foundation of the temple was anterior to the arrival of the Ionian colonies in Asia Minor, who found the worship of Artemis or Diana already established there. It was enlarged and 7 times restored at the expense of all Asia, and became one of the 7 wonders of the world. Its length was 425 feet, and its width 220 feet. Its roof of cedar, resting on a marble entablature, was supported by 127 or 128 columns, 60 feet high, each of them, according to Pliny, the gift of a king. The statue of the goddess Diana was of ivory, and furnished with exquisitely wrought golden ornaments. This was the largest of the Greek temples, occupying more than 4 times the area of the Parthenon at Athens. The architectural beauty of the interior was heightened by the presence of the masterpieces of the most eminent artists, and the wealth which it contained was equalled only by that at Delphi. During the night on which Alexander was born, in 356, this magnificent structure was burned to the ground, by the caprice of a certain Erostratus, who avowed that he had no other object than to immortalize his name. A little later, when the Macedonian king had passed the Granicus, he offered to rebuild the temple with its former magnificence, if he might be allowed to inscribe his own name upon the frontispiece. The pride of the Ephesians rejected the offer, and it was restored by the combined and enthusiastic efforts of all the Ionian cities, under the direction of the architect Dinocrates. The right of asylum extended for a stadium around it; but this privilege, which caused the town to be overrun with criminals, was abolished by Augustus. Under the emperors the medals of Ephesus bore a representation of the temple. Ephesus was visited A. D. 54 by St. Paul, whose preaching occasioned a famous tumult, and to the Christians there he directed one of his epistles. It was the seat of one of "the seven churches which are in Asia," and the 3d œcumenical council was held there in 431, in the reign of Theodosius II. Upon a part of the site of ancient Ephesus is the Turkish village of Aya Soolook, and the entire disappearance of so huge a mass as the temple of Diana can only be accounted for by supposing that the materials were carried away and incorporated into other buildings. (See "Ephesus and the Temple of Diana," by Edward Falkener, London, 1857.)

EPHOD, one of the articles of the official dress worn by the Hebrew priests, consisting of two parts, one covering the breast and the other the back, and both united upon the shoulders, and sometimes described as thrown over the shoulders, hanging down before, crossed upon the breast, and then carried round the waist to serve as a girdle for the robe. It was of two kinds: one of plain linen, for the priests; and the other, for the high priest, "of gold, and blue, and purple, and scarlet, and fine twined linen," richly embroidered. On the shoulders of the high priest's ephod were two onyx stones, set in gold, having engraved on them the names of the 12 tribes, 6 on each stone; and where it crossed the breast was a square ornament, called the pectoral or breastplate, in which were set 12 precious stones, each bearing the name of one of the 12 tribes engraved on it. The girdle was probably woven with the ephod, or upon it, so that coming out from it, on each side, it was brought round under the arms like a sash, and tied on the breast, thus securing both the ephod and the robe. The ephod, or something like it, and called by the same name, was worn by others beside the priests.

EPHORI (Gr. ἔφοροι, to oversee), popular magistrates at Sparta from the earliest times. The origin of the office was variously ascribed to Lycurgus, to Theopompus, and to the era of the first Messenian war, but it seems to have been too ancient for its institution to be historically traced. The authority of the ephori was designed as a counterpoise to that of the kings and council, and hence Cicero has instituted a comparison between the Spartan ephoralty and the Roman tribunate. They were 5 in number, and chosen from and by the people without any qualification of age or property. The mode of their election is not now known. Aristotle calls it puerile, and it is supposed to have been by some species of lot. They held their office

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for one year, entering upon it at the autumnal solstice, the beginning of the Lacedæmonian year. They met daily and took their meals together, in the building in which foreigners and ambassadors were entertained. They had judicial authority in civil cases, and the power to make scrutinies into the conduct of all magistrates. In early times the privileges of the office were such that in the hands of able men it might be made an instrument of unlimited power, and in later times even the kings were called before its tribunal, and the assemblies of the people were convened only by its authority. During the Peloponnesian war the kings became completely under the control of the ephori, so that the latter received foreign ambassadors, subscribed treaties of peace, and sent out armies; and even on the battle field the king was attended by 2 ephori as councillors of war. The ephoralty is thought by Müller to have been the cause of the instability and final dissolution of the Spartan state. The kings were obliged to court popular favor in order to uphold their power, and thus, contrary to the spirit of the Spartan constitution, the government became a democracy instead of an aristocracy. The ephori became at length associated with all opposition to the extension of popular privileges, and the office was abolished for a time by Agis and Cleomenes. It was, however, restored by the Romans.

EPHRAEM SYRUS (the Syrian saint), the most prominent instructor of the old Syrian church, and one of the most prolific theological writers of the early Christian church in general, died probably in 378. He was first teacher at a school in Nisibis, and afterward took up his abode at Edessa, which was already becoming the centre of Syrian scholarship. He subsequently lived near Edessa as a hermit, devoting all his time to prayer, the study of the Bible, and the writing of theological works against the remains of paganism in his country, and the heresies of his times. It is believed that he founded at Edessa a theological school, and spent 8 years in Egypt, where he is said to have become acquainted with Basil the Great, to have been ordained by him a deacon, and to have written works in the Coptic language. He was called by his countrymen the cithara of the Holy Ghost, and, because he transplanted Greek learning into the Syrian church, the prophet of the Syrians. His ascetic and exegetic works were valued in the early church so highly, that passages were frequently read from them at the religious meetings. Hymns and prayers which are ascribed to him are still in use in the Chaldean, Syrian, and Maronite churches. Some of his numerous works are extant in the original Syriac, many others exist in Greek, Latin, and Armenian translations, and many are lost. The most complete edition was published at Rome from 1732 to 1746, in 6 volumes, 3 of which contain the works in Syriac with a Latin translation, 3 the Greek texts. A good German translation of a large portion of his works was published by Pius Zingerle, at Innspruck, from 1830 to 1838. A tasteful English translation of several choice hymns, songs, and homilies was made by Henry Burgess ("Select Metrical Hymns and Homilies of Ephraem Syrus," 2 vols. London, 1853). A new complete edition is expected to be published soon in Germany by Alsleben, who in 1853 wrote a life of Ephraem.

EPHRAIM, a city mentioned by St. John as "near to the wilderness," with no further clue to its position. The wilderness referred to is doubtless the wild and rocky desert of Judæa, and the town is located by Eusebius 8 m. and by St. Jerome 20 m. N. of Jerusalem. Dr. Robinson identifies it with the modern Taiyibeh, 5 m. N. E. from Bethel, and overlooking the desert country which lies between it and the valley of the Jordan.

EPHRAIM, 2d son of Joseph, the founder of the tribe of Ephraim. This tribe occupied one of the finest and most fruitful territories of Palestine, in the very centre of the land. It included most of the province afterward called Samaria, and contained many of the historically most distinguished places of Palestine between the Jordan and the Mediterranean, having the tribes of Dan and Benjamin on the S. and of Manasseh on the N. It was crossed by the mountain range bearing its name. The tribe of Ephraim, numerous and influential, often appears as the representative of the 10 tribes, or the northern Hebrew state, both in historical and prophetical passages of the Scriptures. It held for a long time the ark and the tabernacle at Shiloh.

EPIC (Gr. *επικος*, from *επος*, speech), one of the 3 styles of poetical composition, distinguished from the lyric by representing action rather than emotion, and from the dramatic by representing events through narration instead of through imitative action. In a general sense, it may embrace all poetry and fiction that are chiefly of a narrative character, as the mediæval metrical romances and the modern novels; but it is more properly applied to poems which follow the history of national or mythological events of momentous interest. The epic gives external and plastic views of life, deals with masses of men animated by the same political or religious idea, and illustrates the character and problem of a nation, or civilization, unlike the drama, which treats of individual character and fortunes. Thus the conquest of Troy, the theme of Homer's "Iliad," was an object of national and religious enthusiasm to all the Greeks; the conquest of Jerusalem, the subject of Tasso's *Gerusalemme Liberata*, was a matter of highest interest to all Christendom; and the sacred subjects in Dante's *Divina Commedia* and in Milton's "Paradise Lost" may be regarded as typical of Christian thought and civilization. The *Ramayana* and the *Mahabharata* are celebrated ancient Indian epics, and the French romances of the *trouvères* and the German *Nibelungenlied* are of an epical character. Other epic poems are the Persian *Shah-*

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Nameh of Firdusi, the "Odyssey" of Homer, and the *Argonautica* of Apollonius in Greek; the "Æneid" of Virgil, the "Pharsalia" of Lucan, and the *Punica* of Silius Italicus, in Latin; the "Lusiad" of Camoëns in Portuguese; the *Araucana* of Ercilla in Spanish; the *Orlando Furioso* of Ariosto in Italian; the *Henriade* of Voltaire in French; and the "Messias" of Klopstock in German. Goethe's *Hermann und Dorothea* also may be called a domestic epic.

EPICHARMUS, a Greek dramatic poet, the founder of the old Doric comedy, born on the island of Cos about 540, died in 450, or, according to Lucian, 443 B. C. He repaired to Syracuse in 484 or 483 B. C., where he passed the remainder of his life, and at the court of Hiero he made acquaintance with several poets, among whom was Æschylus, the father of Greek tragedy. He conceived the idea of transforming the loosely constructed farces of which the Sicilian comedy consisted into pieces as regular and correct as the Athenian tragedies. He effected as great a reform in comedy as Æschylus in tragedy, diminishing the number of the actors, introducing a more elegant and poetic language and a more elaborate plot. He was the author of 52, or, according to others, of 35 comedies, of which only the titles remain. His works were especially esteemed by Plato, who has made many quotations from them.

EPICTETUS, a Roman stoic philosopher, born in Hierapolis, in Phrygia, in the first century of our era, died near the middle of the 2d century. He was in his youth a slave of Epaphroditus, who was one of the guards of Nero. It was under the training of this cruel master that he developed the admirable patience for which he was distinguished. Epaphroditus having once struck him heavily upon the leg, he said to his master: "You will break my leg." The prediction was speedily fulfilled, when the philosophic slave said again calmly: "Did not I tell you you would break it?" This extreme insensibility to pain was a fundamental principle in the philosophy of Epictetus. He became a freed man, though neither the cause nor the time of this change in his condition is known. He was involved in the proscription by which Domitian banished all philosophers from Rome, and retired to Nicopolis in Epirus, where he opened a school of stoicism, and held those conversations which have been preserved to us in the "Manual" and "Philosophical Lectures" which were compiled from his discourses by his pupil Arrian. He probably returned to Rome after the death of Domitian, but no other details of his life have been preserved. Like the other stoic philosophers, he taught by his example. He esteemed philosophy to be neither profound speculation nor eloquent discourse, but the love and practice of virtue. The few Romans who cultivated philosophy were all eclectics and Platonists in metaphysics and stoics in moral philosophy. Ethics was the only part of philosophy in which they took a serious interest, and with great faith in Roman manners and society they cared little for the solution of metaphysical problems. Seneca, Epictetus, and Marcus Aurelius were only moralists, and their stoicism was only Roman heroism reduced to a system. Their philosophy was a scheme of practical duties, and, regarded abstractly, was neither thorough nor consistent. Thus they proclaimed the reason, but reason with them became merged in calm and unswerving purpose. They demonstrated a providence, but their providence was destiny. The teachings of Epictetus are summed up in the formula: "Bear and forbear." Recognizing only will and reason, his highest conception of life was to be passionless in whatever circumstances. "Man," he said, "is but a pilot; observe the star, hold the rudder, and be not distracted on thy way." Epictetus himself is supposed to have committed nothing to writing. The best edition of all the remaining works of Arrian is that of Schweighäuser, in the collection entitled *Epictetea Philosophia Monumenta*, (5 vols. 8vo., Leipsic, 1800). They were well translated into English by Elizabeth Carter (London, 1758).

EPICURUS, a Grecian philosopher, born in the island of Samos in 342, died in 270 B. C. The son of a colonist from Gargettus, a demos of Attica, he received his early education on his native island. When 18 years of age he went to Athens, where he became a pupil of Pamphilius, and an admirer of the doctrines of Democritus. In his 23d year he returned to his family, then living at Colophon, travelled for several years, and finally in his 30th year settled at Athens. There he established a school of philosophy, and his fame soon attracted a great number of scholars. With them he constituted a community which has always been considered as a model of its kind. He enjoyed the respect and love of his followers to such a degree that his sayings had almost the value of oracles. No other ancient school of philosophy has evinced a cohesive power equal to that of Epicurus. Epicureanism has, in the course of time, become almost a synonyme of sensualism, or at least a refined voluptuousness, while nothing was further from the meaning of his doctrines. It is true that he taught εὐδαιμονία to be the highest end and purpose of human life, but this word was intended to designate a state of supreme mental bliss, to be attained only by temperance, chastity, and a healthy intellectual development. That bliss, consisting in a perfect repose of mind, in an equilibrium of all mental faculties and passions, is perhaps not very different from the state of mind which the stoics considered as the acme of human perfection, although they were the most unrelenting adversaries of Epicureanism. Personally Epicurus was a man of unsullied morality. He was a most voluminous writer (πολυγραφώτατος), says Diogenes Laërtius, who estimates the number of his works at 300 or more. He boasted of having never used any quotations in order to

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swell his volumes. Few of his writings have been preserved, but a full analysis of his doctrines is to be found in Diogenes Laërtius, and this, taken in connection with numerous passages in the writings of Lucretius, Cicero, Pliny, and others, gives us a full insight into his philosophical system. Within the present century a fragment of his book on nature has been recovered from the ruins of Herculaneum, and published by Orelli (Leipsic, 1818). Philosophy, according to Epicurus, is the exertion to obtain happiness by reasoning. The supreme bliss (*ευδαιμονια*) is enjoyment and perfect freedom from pain. Enjoyment is either passive, when a perfect repose of mind is its principal condition, or active (*ηδονη καταστηματικη* and *ενκινησια*). The former is preferable to the latter. It is the state of absolute absence of pain. Sensations, whether agreeable or disagreeable, are of the same nature; it is only the consequences which constitute their difference. Hence it is the province of reason to discern them according to the ultimate effect they produce. Virtue in itself, irrespective of its consequences, has no value. It is merely the result of wisdom and sagacity (*φρονησις*), which prove to man that happiness is only to be attained by charity, peacefulness, temperance, patience, self-command. Human or natural rights are merely restraints of individual action, imposed by the necessities of social life. It is self-interest which enjoins us to do right. The repose of mind which constitutes human happiness being continuously disturbed by the uncertainty of the relations of man to the universe and divinity, Epicurus proposed to dispel that uncertainty by a reconstruction of the atomistic theories of Democritus, in the following manner: Nothing comes from nothing. That which exists can never be annihilated. All matter consists of atoms, and these are unchangeable and indivisible, although filling a certain space. Beside shape, volume, gravity, and motion, they have no properties. Their number is infinite, their shape indefinitely varied. The nniverse is infinite, and, considered as a unit, unchangeable, for the aggregate quantity of matter remains always the same, however its component parts may combine. The universe cannot be the product of divine action, or else the existence of evil could not be accounted for. The atoms blindly drifting through infinite space, and declining somewhat from their conrse (through an accidental cause, the nature of which Epicurns fails to explain), are mingled together, shove and push one another (the chaos), until the homogeneous ones associate. The light round atoms (the atoms of fire) are pushed upward, where they form the celestial bodies; those which are somewhat heavier form the air, while the heaviest are precipitated as water and earth. In a similar way the different objects on earth are formed. But the whole process is merely an accidental aggregation of atoms; higher ends and divine laws are mere inventions of the human mind. The psychology of Epicurus flows directly from his natura. philosophy. The human soul, according to him, is a delicate and extremely mobile substance, consisting of the minutest round atoms. Its elements are warmth, air, breath, and another nameless substance on which sensibility depends. While the 3 first named are distributed through the whole body, the 4th has its seat principally in the pectoral cavity, and is, as it were, the soul of the soul. The soul is not immortal; nevertheless death is by no means to be considered as an evil, since there remains no consciousness of annihilation after death. Of all objects filling space infinitely delicate images are secreted. These images, coming into contact with the organs of sense, create perceptions. The conceptions of imagination are arbitrary combinations of such delicate images of real objects. By frequent perceptions the human mind attains to general abstractions, which are merely collective conceptions of the features common to a larger or smaller number of individual perceptions. Since the senses are the receivers of mechanical secretions of objects (images), the knowledge obtained through them is real and objective, the only correct standard of truth; but the workings of imagination, being likewise the result of sensitive perception, although an indirect one, point also to existing realities. Hence it follows that the universality of the belief in the existence of a Supreme Being is proof conclusive of such existence. The gods are living beings of human shape but colossal proportions. They also consist of atoms. They are immortal, although their bodies are similar to the human body. This contradiction is explained by a certain equilibrium of contrasts in the universe (*ισονομια*). The gods are living in eternal bliss, that is to say, in absolute inactivity, in the quiet enjoyment of sublime wisdom and virtue. The spaces between the different celestial bodies (*intermundia*) are the seats of the gods.

EPICYCLE (Gr. *επι*, upon, and *κυκλος*, circle), the path of a point moving uniformly in the circumference of a circle, whose centre moves uniformly in the circumference of a second circle, whose centre may move in the circumference of a third, &c. The epicycle is famous in the history of science, as the first attempted hypothesis to explain the irregularity of the planetary motion. The discussion of this curve was an admirable mathematical drill to the early astronomers. In modern times, the epicycle is used in order to express in a few words the numerical value of periodical functions of an unknown law. Thus if the fluctuations of the thermometer for a day be observed, the size and initial position of several circles may be calculated, such that if the centre of the 2d move uniformly round the 1st once in 24 hours, the 3d round the 2d once in 12 hours, the 4th round the 3d once in 8 hours, &c., the height of the centre of the 4th or 5th circle will be the same as that of the mercury.

EPICYCLOID, the path of a point in the cir-

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cumference of a circle rolling upon the circumference of another circle. If the rolling circle rolls upon the inside of the stationary circle, the curve is called a hypocycloid. When the point generating the curve is not in the circumference of the rolling circle, but inside of it on a radius, or outside on a radius prolonged, the curves are called epitrochoids or hypotrochoids (Gr. τροχοειδης, circular). Epicycloids and hypocycloids are remarkable from the fact that whenever the diameters of the two circles are in exact numerical ratio, the length of the curve is also in numerical ratio to the diameters. They also contain several curves interesting from their physical properties; for instance, if the circles are of equal size, the epicycloid becomes the cardioid, which is the caustic produced by reflection from a circle, when the luminous point is in the circumference; if the rolling circle is half the diameter of the stationary circle, the epicycloid is the caustic produced by the reflection of parallel rays from the inside of a circle, while the hypocycloid becomes a straight line.

EPIDAURUS (the modern Epidavro), an ancient city of Greece, in Argolis, on the Saronic gulf, enclosed by high mountains, and which formed, together with its small adjacent territory, an independent state. According to Strabo, it was founded by a Carian colony, and originally named Epicarus. It subsequently received an Argive colony, and became a part of the Doric league, of which Argos was the head. It had an aristocratic constitution, was an important commercial city, and colonized Ægina; but it rapidly declined in the 6th century B. C., its commerce passing into the hands of the Æginetans. It was chiefly distinguished for its splendid temple of Æsculapius, bearing the inscription: "Let only pure souls enter here," which stood a little to the west of the city, on the road to Argos, between two mountains, in a thickly wooded grove, in which it was unlawful for any one to be born or to die. The temple was near the centre of this sacred grove, and contained a chryselephantine statue of the god, which represented him as seated upon a throne, holding in one hand the head of a serpent, and in the other a staff, while a dog lay at his feet. Near the temple there was the Tholus, a circular structure, containing medicines for all diseases, a theatre, the bath of Æsculapius, and other temples dedicated to Diana, Venus, Themis, Hygeia, and Apollo. Pilgrimages were made to this temple by the sick, and every 4 years a festival, with musical and gymnastic exercises, was here celebrated. The wealth of this temple became the plunder of Roman conquerors. Some of its foundations are still traced, and the theatre which was adjacent to it is one of the best preserved of all the old Greek edifices. The modern Epidavro is a small village, noted as the place of assembly of the first Greek congress in 1821.

EPIDEMIC DISEASES (Gr. επι, upon, and δημος, people) are those which attack at the same time a great number of persons in a given locality, depending on some temporary, accidental, and generally inappreciable cause; differing in this respect from endemic diseases, or those developed under the influence of some constant or periodic cause. Many diseases, ordinarily sporadic, may become epidemic under certain ill-understood conditions; or some new disease, introduced by contagion or other favorable circumstances, may spread epidemically. The limits of this work will not permit even an allusion to the phenomena of development, progress, and treatment of this great category of diseases; the investigation of their causes is extremely difficult, and has given rise to the most fanciful, absurd, and contradictory opinions; and the solution of the problem of a single one involves a rigorous examination of the constitution of the air, the conformation of the soil, the nature of the food, and even the social habits of a country. The progressive sciences of meteorology and physical geography will probably soon throw additional light upon these difficult questions; the most important sanitary and hygienic improvements often depend upon the removal of apparently trifling causes of disease, and the consideration of this matter is now actively engaging the attention of both physicians and municipal authorities. Having ascertained the cause, or the epidemic tendency of the season, the treatment must depend on the nature of the disease and the constitution of the patient; even when remedial measures seem powerless, the physician can do much to check an epidemic by inspiring confidence and moral courage, and by withdrawing the attention of a community from the continual consideration of any supposed causes. Experience has shown that calmness, cheerfulness, absence of fear, attention to the ordinary rules of health, avoidance of obvious causes of disease, the precaution not to make any sudden change in food and habits of life, and especially total abstinence from advertised or lauded specifics, are the best means of avoiding epidemic diseases or of passing lightly through their attacks. The human constitution may become acclimated to epidemic diseases in malarious climates, as is shown by the greater mortality among new comers; in the white races there is no acclimation against endemics of intermittent and bilious fevers and other marsh diseases, as the experience of our southern states and the Pontine marshes of Italy fully proves; negroes to a certain extent become insusceptible to the effluvia of the rice fields, but not so much so to the causes of disease on the cotton plantations. The smallest admixture of negro blood is a great protection against yellow fever, and a quarter mixture has been considered as perfect a safeguard as is vaccination against small pox. Negroes suffer more than whites from cholera, typhoid diseases, plague, and small pox, and are much less liable to intermittents as well as yellow fever. (See Acclimation).

EPIDERMIS, or Cuticle, the thin semi-transparent pellicle which covers the surface of the

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dermis or corium. It is composed of layers of tessellated or pavement epithelium cells, of a flattened oval or polygonal shape, and about $\frac{1}{3000}$ of an inch in diameter; each cell contains a nucleus with several distinct paler grannles. The cells are developed from germs supplied by the basement membrane, nourished by the subjacent vessels, and cast off externally from time to time, to be succeeded by others; when first formed they are spherical, gradually becoming dry and flattened; the deeper layers are more distinctly cellular, while the outer ones are scale-like. The epidermis has no vessels nor nerves, but is pierced by the dncts of the sebaceous and sweat glands, and by the shafts of the hairs or feathers. The rete mucosum seems to be composed of the same microscopic elements as the overlying epidermis, being the principal seat of the pigment cells which give the color to the skin. The epidermis covers the whole exterior of the body, even the front of the eye, and is continuous with the epithelium of the internal mucous membrane; it is thickest in those parts most subjected to friction, as on the heel and the palms of the hands, where it becomes almost as hard as horn. Its use is to protect the sensitive trne skin from mechanical injury or the contact of air; in the living body, when abraded, it is speedily replaced; but when removed by maceration or otherwise after death, the cutis underneath soon becomes brown and dry. The chemical composition of the thick epidermis of the heel has been found to be very nearly the same as that of the corneous matter of nails, hoofs, horns, and hair. The epidermis is familiarly seen in the occnrrence of blisters, whether produced by friction or the application of irritating substances, constituting the raised portion under which the fluid is effused. The epidermis not only prevents evaporation from the dermis, but also prevents absorption of fluids from without; it is well known to the physician, that in introdncing medicinal agents into the system by the endermic method, the process is rendered very much more rapid and effectual by previously removing the epidermis by a blister.

EPIDOTE (Gr. *επιδιδωμι*, to increase), a mineral of the garnet family, being a silicate of alumina, oxide of iron, and lime. The species includes several varieties, as: 1, epidote proper, called also pistacite, or the lime and iron epidote; 2, lime epidote; 3, manganesian epidote; 4, cerium epidote. The mineral occurs crystallized, and in grannlar masses. Hardness 6–7; specific gravity 3.25–3.5. The colors are generally various shades of green. The finest specimens are brought from Arendal in Norway. They are also obtained at Franconia, N. H., Haddam, Conn., and at numerous localities in which crystalline rocks are found.

EPIGONI (Gr. *επιγονοι*, descendants), the 7 sons of the 7 Argive heroes who, under command of Adrastns, besieged Thebes. The war of the fathers was styled that of the "Seven against Thebes," and Adrastus alone of the combined princes survived it; the war of the sons was styled that of the "Epigoni," and the only Argive hero that fell was Ægialeus, the son of Adrastus. In this second expedition Thebes, abandoned by its inhabitants, was razed to the ground.

EPILEPSY (Gr. *επιλαμβανω*, to seize upon). This is one of the most horrible diseases that afflict mankind, and it is not snrprising that, in ignorant ages, in Rome, in Egypt, and elsewhere, epileptics were considered as having excited the ire of the Divinity, or as possessing supernatural powers, on account of which they were worshipped. This was due to the violence and extraordinary force developed by the muscles in epileptic convulsions; the screaming, the changes in color, and the contortions of the face, the biting of the tongue, followed by a comatose state and afterward by a degree of mental alienation. There are so many varieties of epilepsy that it is impossible to give a definition of the disease that will apply to them all. However, in most cases, epilepsy is characterized by convulsions and loss of consciousness, occurring at longer or shorter intervals, during which the patient is almost in good health. The absence of fever in epileptics serves to distinguish their affection from meningitis and other inflammations accompanied by convulsions. The loss of consciousness also distinguishes epilepsy from hysteria. As in most nervous diseases, a hereditary tendency is among the most frequent predisposing causes of epilepsy. Leuret and Delasiauve endeavor to show that it is very rarely inherited; but the testimony of many others leaves no doubt about the frequency of this predisposing cause. Epilepsy often appears in the offspring of persons who have had various other nervous complaints. Bouchet and Cazauvielil say that out of 130 epileptics 30 were descendants of persons who had been either epileptic, insane, paralytic, apoplectic, or hysteric. As regards the predisposing influence of sex, there is no donbt that women are much more frequently attacked by epilepsy than men. As regards the influence of age, we find by a comparison of the statistics given by several English and French authorities, that the most frequent periods of life at which epilepsy begins are early infancy and the age of puberty. Epilepsy often appears also in very old age; Delasiauve remarked that out of 285 epileptics the disease began in 10 when they were from 60 to 80 years old. In fact, there is no age that escapes. As regards climate, nothing very positive has been established, but it seems probable that the disease is more frequent in hot and in very cold than in temperate climates. Although we have no scientific data to rely upon, we think that the extreme variations of the climate of the United States are among the causes of the greater frequency of epilepsy in this country than in England, France, and Germany. Herpin, with others, states that epilepsy is more common in persons of low stature; but even if this be true, Herpin is wrong in considering the short-

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ness of stature a predisposing cause of the disease, as in many of the cases on which he grounds his view it is partly the influence of epilepsy, already existing in childhood or in adolescence, that has prevented the development of the body. Various malformations of the body, and especially of the cranium, are certainly among the most frequent predisposing causes. Weak constitutions, as proved by Esquirol and lately by Dr. C. B. Radcliffe, are favorable to the production of epilepsy. Among other predisposing causes are dentition, the first appearance and the cessation of menstruation, onanism, and the abuse of alcoholic drinks. Almost all kinds of diseases may produce epilepsy, but among the principal we must place those affections in which the blood becomes altered or diminished in its amount, and organic affections of the membranes of the cerebro-spinal axis and of certain parts of this nervous centre. Another very powerful cause, the influence of which has been demonstrated by Marshall Hall and recently by Kussmaul and Jenner, and by Brown-Séquard, is excessive loss of blood. Pregnancy, parturition, and menstruation, frequently cause epilepsy. A tumor on a nerve, or any cause of irritation on the trunk or the terminal part of any sensitive nerve, and especially in the skin or a mucous membrane, very often produces it. A wound, a burn, worms in the bowels or elsewhere, stone in the bladder or in other places, a foreign body in the ear, &c., are known to have caused epilepsy. It is quite certain that great mental excitement or emotion has originated epilepsy in many cases, but it seems probable that the disease was not produced by those causes, but has only been brought to manifest itself by this kind of excitement.—When a complete fit is about to take place, it is usually preceded by some sensation or some change in the mind of the patient. If a sensation precedes the fit, it comes most frequently from some part of the skin, and especially from that of the fingers or toes. This sensation is well known under the name of *aura epileptica*. There is as much variety as regards the kind and the intensity of the sensation as there is in respect to its point of starting. Most frequently, however, the aura is a sensation of cold, of burning, or that kind of sensation produced by a draft of cold air on a limited part of the body. Sometimes the aura starts from the eye or the ear, and then a flash of light or some other sensation comes from the retina, or peculiar sounds are heard. Some epileptics become gay, others mournful, when they are about to have a fit; in others the attack is announced by some change in the digestive functions. Whether preceded or not by an aura or by any change in the functions of the various organs, a complete attack usually begins with an extreme paleness of the face, and at the same time or nearly so there are contractions of several muscles of the face, the eye, and the neck. Observers do not agree as regards the first manifestation of a fit, probably because the seizure does not always begin with the same phenomenon. Not only have we known the first symptom not to be the same in different epileptics, but in the same one we have seen differences in this respect in 3 different attacks. Some epileptics certainly are exceptions to the rule advanced by Dr. C. J. B. Williams, which is that the first manifestation of an attack is a palpitation of the heart. Many physicians think the scream is the first symptom. It often is, but the paleness of the face usually precedes it. Some epileptics do not scream. As soon as these symptoms have appeared, a rigid tetanic or at least tonic spasm takes place in the limbs, and the patient falls. Respiration is suspended, and the face becomes quite injected with black blood, and assumes a hideous aspect both from the spasms of its muscles and the blackish or bluish hue. Sometimes a momentary relaxation is then observed in the limbs; but almost at once clonic convulsions occur everywhere in the trunk, the limbs, the face, and often in the various internal organs of the bladder, the bowels, and even in the uterus. The mouth then ejects a frothy saliva, often reddened with blood from the bitten tongue. The respiratory muscles, after the first spasms which produce the scream and suffocation, causing a gurgling or hissing sound, become relaxed, and then those employed in inspiration contract, and almost as soon as air has reached the lungs the convulsions cease or notably diminish. Ordinarily the fit is over in a few minutes; but it is not unfrequently the case that after a general relaxation another seizure comes on, and sometimes many occur with very short intermissions. During the whole time the fit lasts the patient is deprived of consciousness, and when he recovers he remembers nothing that has taken place in the mean time. In some cases the seizure is followed by a prolonged coma, ending sometimes in death. When the patient recovers from a fit, even if it has not been a very severe one, he usually feels extremely fatigued and suffers from headache. Fortunately, however, he soon falls asleep, and ordinarily is almost as well as usual when he wakes up, except that the headache and the fatigue still exist, though much diminished. When many fits have taken place, even at somewhat long intervals, such as several weeks, mental derangement often supervenes, and in this way epilepsy leads to insanity. In some cases the fits recur at regular periods; in others they return with every return of the circumstances which seem to have caused the first, such as menstruation, pregnancy, the influence of certain seasons, &c. There is seldom great regularity in the length of the intervals between the fits, and they come every day, every week, every month, &c., at irregular hours. Many patients have very different intervals between their successive fits. Some have many fits a day, others one every 6 months, or every year. Delasiauve mentions a case in which the number of fits was 2,500 in a month. But the greater the number of fits the less violent they generally are.—We have already said that the

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varieties of epilepsy are numerous; and among them the two principal especially require to be noticed. In a complete fit of epilepsy there are two distinct features: 1, the loss of consciousness; 2, the muscular convulsions. Each of these may exist alone. In the case of a seizure consisting only in the loss of consciousness without convulsions, we have the so called epileptic vertigo, which is a form of epilepsy that frequently exists alone, and also coexists often with the form of the disease in which the attack is complete. In this last case the patient sometimes has a complete seizure, sometimes only a more or less prolonged attack of vertigo. Whether vertigo exists alone or coexists with complete attacks, it is a very dangerous affection, not for the life of the patient, but because fits of simple vertigo lead more frequently to insanity than complete fits of epilepsy. The cases of epileptiform convulsions without loss of consciousness are not so frequent as the cases of simple vertigo. They are particularly produced by injuries to the nerves or to the spinal cord.—The nature of epilepsy, the material and dynamical conditions of the parts which are affected in the animal organism, have been greatly illustrated by the researches of modern physiologists and practitioners. Dr. Marshall Hall thought the seat of epilepsy to be chiefly in the medulla oblongata, and that its nature consisted in an increased reflex power, at least in the beginning of the disease, and also that the convulsions were the results of the asphyxia caused by the closure of the larynx (*laryngismus*). This theory is in opposition to several facts. In the first place, although laryngismus almost always exists and certainly concurs in the production of asphyxia, and in so doing generates convulsions, it cannot be considered as the cause of convulsions, as it does not always exist, and as there is one kind of convulsions (the tonic) which precedes the asphyxia. Beside, there are more powerful causes of asphyxia in the condition of circulation in the brain and the spasm of the muscles of the chest. Then, as regards the increased reflex power, Dr. Hall acknowledges that this power is diminished in persons who have been epileptic for some time. We cannot admit therefore that the disease consists in the increase of this power. Another theory has been recently proposed by Dr. Brown-Séquard. Guided by experiments on animals, in which he produces epilepsy, he has found that the reflex power is composed of two distinct powers, one of which he calls the reflex force and the other the reflex excitability. He has found that the reflex force may be very much diminished while the reflex excitability is very much increased. This last power is the power of impressibility of the cerebro-spinal axis; in epileptics this impressibility is very much augmented. The slightest excitations may produce reflex actions in them. In the beginning of epilepsy, usually the other reflex power, which is the force manifested in the reflex actions of the cerebro-spinal axis, is increased; but after a time this force diminishes, and in most cases it becomes less, and even much less, than in healthy people. Now the nature of epilepsy seems to consist in an increase of the impressibility, or, in other words, of the reflex excitability of certain parts of the cerebro-spinal axis. In most cases of epilepsy these parts are the medulla oblongata and the neighboring parts of the encephalon and of the spinal cord. But the seat is not constant, and may be sometimes limited to the oblong medulla or extended to other parts of the cerebro-spinal axis. Dr. Brown-Séquard has tried to explain this mysterious phenomenon of loss of consciousness. It seemed very strange that at the same time that certain parts of the encephalon were acting with great energy, another part should be completely deprived of action. This, according to the above named writer, is very simple. The blood vessels of that part of the brain which is the seat of consciousness and of the mental faculties, receive nerves from the medulla oblongata and the spinal cord; these blood vessels when they are excited contract and expel the blood they normally contain, and it is known that all the functions of that part of the brain cease when they do not receive blood. Now, when the excitation that exists in the beginning of a fit acts upon the medulla oblongata and its neighborhood, it produces at the same time the contraction of the blood vessels of that part of the brain which we have mentioned, and a convulsive contraction of the muscles of the face, the eye, the neck, the larynx, &c., all parts receiving nerves from the same source as these blood vessels. In this way the loss of consciousness is explained. The following table from Dr. Brown-Séquard's work on epilepsy shows how the principal phenomena of epilepsy are generated:

Causes.	Effects.
1. Starting of an excitation from a sensitive or an excitable part of the nervous system.	1. Contraction of the blood vessels of the brain proper and contraction of some muscles, by a reflex action from the central seat of the disease.
2. Contraction of the blood vessels of the brain proper.	2. Loss of consciousness.
3. Accumulation of blood at the base of the encephalon, due to its expulsion from the brain proper, &c.	3. Spasm of the larynx and of the muscles employed in expiration.
4. Spasm of larynx and of expiratory muscles.	4. Cry and asphyxia.
5. Asphyxia.	5. General clonic convulsions.
6. Exhaustion of nervous power, except of the part of the nervous centres employed in respiration.	6. Cessation of the convulsions and return of respiration.
7. Return of respiration.	7. Return of consciousness.

—The first thing to be done for an epileptic is to find out the cause of the disease, and to try to get rid of that cause if it still exists. Very often epilepsy depends upon some external cause of irritation which may easily be removed; it is of the greatest importance to discover if there is anywhere such an irritation, and as the patient may not be aware of its existence, it is necessary to look for it everywhere. Of the various modes of treatment, the most powerful

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are those means of exciting the skin which most readily produce a change in the nutrition of the encephalon and spinal cord. All physicians know what these means are. One of the most efficacious remedies is belladonna. Physicians should not despair of curing their patients, and should not change a mode of treatment until they have given it a fair trial; and patients and their families should remember that the rules of hygiene must be followed by epileptics much more closely than by those afflicted with almost any other disease.

EPIMENIDES, a poet and hero of Cnossus, in the island of Crete, flourished in the 7th century B. C. He was a contemporary of the seven wise men of Greece, among whom he is sometimes counted in place of Periander. He was principally occupied with politics and legislation, but of his treatises on these subjects nothing remains. He also wrote a poem upon the Argonautic expedition, which is lost. There are many fabulous accounts of his life. He is said to have passed 57 years in profound sleep in a cavern, and to have possessed the marvellous power of separating himself from his body. The Athenians suffering from a plague invoked his aid, and he removed the scourge. His life was prolonged according to some to the age of 229 years.

EPINAL, a town of France, capital of the department of Vosges, and of an arrondissement of its own name, 225 m. E. S. E. from Paris; pop. of the arrondissement in 1856, 96,338, and of the town 10,140. It lies at the foot of the Vosges mountains, and is divided into two nearly equal parts by the river Moselle, along the banks of which there are fine promenades. Its fortifications are now destroyed, and it has only the ruins of its old castle. It has a college, museum, and public library of 18,000 volumes; tanneries, and manufactories of cutlery, copper, china ware, paper, and oil. Marble is quarried in the vicinity.

ÉPINAY, Louise Florence Pétronille de la Live d', a French authoress, born in 1725, died April 17, 1783. She was unhappily married, and while yet young became the mistress of Jean Jacques Rousseau, with whom she lived till he became jealous of Grimm, whom he had himself introduced to her. He was also jealous of her friends Diderot and D'Holbach. She afterward maintained intimate relations with Grimm until his departure from France, when, under the guidance of Diderot, she continued his literary correspondence with the sovereigns of Europe. She wrote an educational work entitled *Conversations d'Emilie*, to which a prize was awarded by the French academy in 1783. Her "Memoirs and Correspondence" (3 vols., Paris, 1818) contains many unpublished letters of Rousseau, Diderot, and Grimm, and abounds with information on French society and character in the 18th century.

EPIPHANIUS, Saint, a father of the church, bishop of Constantia (more anciently Salamis), in Cyprus, born in the district of Eleutheropolis, in Palestine, about 310, died May 12, 403. He was of Jewish parentage, but falling in with Christian teachers was baptized by the bishop Lucian, and from his youth dwelt in the deserts of Egypt among the monks, whose virtues he admired and whose mode of life he adopted. There he joined to the practices of penitence the labors of study, and mastered the Hebrew, Egyptian, Syriac, Greek, and Latin languages. At the age of 20 he returned to his native country, and founded a monastery of which he was for 30 years the superior. He wrote several books for the instruction of the numerous monks whom he had under his care. He was invited in 367 to the bishopric of Constantia or Salamis on the island of Cyprus, and in this station he became known as an ardent adversary of the doctrines of Arius and Apollinarius, and of many of the writings of Origen; yet it is remarkable that he was almost the only Athanasian bishop who was spared by the Arians, then in the height of their power. He visited Rome in 382, where he first met with St. Jerome. He subsequently made a journey to Jerusalem, where he had a lively contest with the Origenist patriarch John, and then repaired to Constantinople, where he took part against Chrysostom. He died at sea, while returning to Cyprus. His most important work is his *Panarium*, a discourse directed against heresies, of which he counted 80. Of all the Greek fathers he wrote in the poorest style, obscure, unpolished, and without order or connection. A standard edition of his works is that of Dionysius Petavius (2 vols. fol., Paris, 1622).

EPIPHANY (Gr. *επιφανια*, appearance, manifestation), a festival of the Christian church, instituted to commemorate the appearance of Jesus Christ to the magi or wise men, who came from the east bringing him presents. It is celebrated on Jan. 6. It is often called the "manifestation of Christ to the Gentiles," and the Greek church terms it the theophany, or appearance of God. The eastern Christians gave it also the name of "feast of light;" in Germany it is known as the "festival of the three holy kings;" and some of the early fathers took it to be the day of our Saviour's baptism, when a voice from heaven declared: "This is my beloved Son, in whom I am well pleased."

EPIPHYTES (Gr. *επι*, upon, and *φυτω*, to grow). This title has been given to those vegetable parasites which are found upon man and other animals. Those which grow within the cavities of the same are called Entophytes. Inasmuch, however, as no definite line can be drawn between the two, and as some species belong to both classes, they will for convenience sake be considered together in the present article. It is only within a few years, and since much attention has been given to the study of cryptogamic botany, that the full nature and importance of the diseases created by many of these growths has been recognized, and the belief in their spontaneous generation been given up. They all belong to the fungi and algæ, but we

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are not yet sufficiently advanced in our knowledge of cryptogamiæ to attempt any minute classification, or to distinguish between these two orders. Robin and Küchenmeister, however, divide them according to their supposed place in the vegetable kingdom, while Virchow and his followers classify them into those really pathognomonic of disease, and those accidentally occurring in it. For this last arrangement the two following conditions are necessary, viz.: the constant occurrence of the parasite in the disease, and the positive result of inoculation. There are some who say that even this is not enough, and that the fungus may carry the matter of contagion attached to itself, and that this propagates the disease. Schönlein throws out such a hint with regard to animal parasites when he advises our cleaning the itch insect with brush and bath before proceeding to inoculate, and Clemens of Frankfort asks: "If we were to find constantly in the vaccine matter one and the same fungus, by the transportation of which new variola existed, which should we call the true inoculating matter, the fungus attached to the lymph, or the lymph attached to the spores?" The dwelling places of the cryptogamiæ seem as universal as their growth is simple. Deep under the sea are lying beds of algæ; within the bowels of the earth they may be found; the air we breathe contains them, and the winds waft them from pole to pole. They form the chief means of resolving dead matter into its original elements, and are present and are gone with a rapidity alike inconceivable. No wonder that men believed in the spontaneous development of these forms, for their appearance in certain situations seems otherwise inexplicable. The animal parasites live mostly on the living tissues of man; with the vegetable the reverse is generally the case, and it is those parts already decomposed or diseased which form their chief support. They usually attack, or better succeed in establishing themselves upon, parts not intimately connected with the system and superficial, and therefore less able to resist their influence; or else they attend upon long disease, when the strength of the body is already wasted. This cannot be said, however, of every species. The character of the soil exercises an important influence over their growth, and may in fact change it entirely. Indeed, we can hardly give any general rules; for some affect an acid nutriment, others alkaline; some grow upon the outside, where there can be no warmth, others within the heated cavities of the body; some thrive best in light and pure air, others in darkness and carbonic acid; some live in fluid, while others are always found dry. It will be seen then that all these points must be taken into consideration before we attempt to destroy them, and a universal parasite killer is an impossibility, for what is death to one species may be the food of another. The effect of their presence on man is as various as that of the animal parasites, though less dangerous. When the plant has found its favorite and essential elements for reproduction, it grows at once, be it on the outer surface or within the body. At first the growth may be merely superficial; but soon the vegetative process, the mycelium, begins to seek nourishment in deeper soil, and its filaments penetrate all tissues, wherever the minutest hole is left for its entrance. The spores or mycelium may, by acting as a foreign body, produce absorption in adjacent parts, and thus make way for their progress inward indefinitely. When once the spores gain admission we may see the same result as when we plant the seeds of larger vegetables in the soil. They send forth their sprouts upward and downward, pushing before them whatever resists their progress. But if in addition to the sprouts we should have our seed increasing by self-division, and to an immense extent, what would follow? What wonder then if this process, carried on beneath the less yielding skin, should lead to inflammation and destruction of the parts? The *oidium albicans* may produce death in an infant by stopping the œsophagus or windpipe. Impaired vision may be caused by the growth of a fungus within the eye. Atrophy and deformity may result from their presence in the hair and nails. Erosions of the skin, and the inflammation they create, may bring on swelling of glands. Parasites may also prove injurious by irritating the nervous system, as in *pityriasis versicolor*, or chemically. The vinous fermentation is brought about by the action of a fungus on sugar, by which it is resolved into carbonic acid and alcohol. Now saliva changes the starchy compounds of food into sugar, and the presence of a fungus may convert this in turn into alcohol. So too the *sarcina ventriculi* and the *oidium albicans* may cause the acetous and lactic acid fermentations respectively. The very decay of vegetable parasites may produce putridity in their masses. There is not the slightest ground, however, to believe the presence of fungoid growths in the body or atmosphere has aught to do with the spread or cause of epidemics. We see then that vegetable parasites are able to work a multitude of evils upon mankind, but the extent thereof must be in proportion to the condition and size of the organ affected. Although they may in some instances be as troublesome, as dangerous to life even, as their animal relatives, still we are not so much shocked to have our head covered with the sporules of the favus plant as with pediculi, though both are marks of uncleanliness, or to know that our stomach is filled with sarcina, as to suspect that a frightful strongylus lies coiled up in our kidney. Before discussing the various species, it will be well to describe in a few words the nature and growth of fungi, referring for further information to the article on FUNGI. They consist of organs of fructification, and a nutritive apparatus. This last is called mycelium, and is made up of threadlike, more or less compacted, elongated cells, which interlace and have no intimate connection. It has such an indefinite form, and differs so little

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in various species, that from it alone we cannot distinguish them. It varies greatly also according to the condition in which it grows, and whether it be viewed damp or dry. It may exist without bearing fruit, as a tree may remain barren in uncongenial soil, but no species can exist without it, though it may be reduced to a very low development when compared to the fruit-bearing system. Subtile forms of mycelium have the power of penetrating to remote parts, and lying dormant for a long time. The reproductive system consists of spores, which are very small, and in some species are enclosed in receptacles. Their number is literally incalculable, and they increase with immense rapidity. They float freely in water, and their walls are very strong, so that they are well calculated to travel far after leaving their birthplace. Their diminutive size enables them to gain admission of course into the smallest crevices of the skin or elsewhere, and they are capable of withstanding great extremes of temperature, so that after being kept in a dry state for a long lapse of time they are found to possess their entire pristine vitality. The whole plan of their development is still little known, and there is good reason to believe that many of them are imperfectly developed states of other plants, which, if they attained their proper sphere, might present a more complex structure; and when we consider the vast number of forms into which a single germ may develop itself according to the soil in which it happens to grow, their real number may be regarded as comparatively small, and this view is adopted by some eminent dermatologists. We are not obliged to believe, therefore, that distinct germs are floating about in the atmosphere, to account for all the species which are found in singular and unique situations; and it is improbable that such matrices as the human skin and mucous membrane, hoofs of dead horses, &c., should produce fungi peculiar to themselves. Some prey directly upon living tissues, while others destroy them first and induce decomposition, before the proper conditions for their development are attained. The fact of possible inoculation on healthy subjects proves that the presence of some forms at least is the essential cause of the disease connected with them. The fact that mycelium may exist for a long time dormant, till proper conditions are provided for its further development, will explain the sudden appearance of a fungus in various peculiar situations. In the potato disease, for instance, the *botrytis infestans* may show itself in a few hours on the freshly cut surface of a tuber, and on microscopic examination we find mycelium traversing the cells in all directions. They grow within nuts and egg shells, in the cavities of tomatoes when no lesion of the walls exists, and are developed within the brains of birds, in the eye and bladder of man, and on globules of milk within the udders of cows. Let any room remain undisturbed for any length of time, and then examine the dust which has collected, and multitudes of vegetable spores will be found. We know not but in each breath of air we inhale, each draught we raise to our lips, are lurking germs which, if they find a proper nidus, may make of us a dwelling-place. What need then to call to our aid the theory of spontaneous development to account for the presence of foes so dangerous, that neither time nor the powers of chemistry avail aught against them, which are so subtile in their invisibility, and may be wafted from one point of the earth to another by wind and wave?—Among the most important of the vegetable parasites of man is the *oidium albicans*, which belongs to the same genus as the fungus which has proved such a destructive pest to the vineyards of southern Europe and Madeira, viz.: the *oidium Tuckeri*. It forms the disease called aphthæ, which shows itself on the mucous membrane, generally on the tongue of infants, as a soft, white, pasty, slightly elevated patch. On the lips, however, where it is exposed to the atmosphere and becomes dry, it forms dark brown crusts. Its seat is first the upper surface of the epithelial cells, but soon its filaments penetrate deeply between them, and can no longer be removed by art. It is found also in the nose, windpipe, stomach, and intestine. It may occur in persons of every age, but especially in young children and old individuals, owing to the liquid form of their food, which allows any accumulation in the mouth to remain undisturbed, and to the long sleep necessary to these ages. It is of frequent occurrence also in the last stages of many diseases, when the mucous membrane is covered with nitrogenous, decomposable matter. According to Küchenmeister, its appearance is due to catarrh of the mucous membrane, which is very common in old age and infancy, and this is without doubt the most frequent predisposing cause. Robin accounts for its presence on the nipples of nurses by the supposed lactic acid reaction produced there, but it is more probable that the disease is transferred thither with the mucus from the child's mouth, and becomes attached by the extension of the mycelium into the epithelium. Oidium has also been found in the nails and on the surface of ulcers. On the disease called diphtheria, which, beginning in France, has within the last two years spread over the continent of Europe, and has reached this side of the ocean, this parasite is found to be a constant attendant. Whether its presence causes the inflammation of the throat, or is merely the result of a proper nidus offered it by this specific disease, is not easy to determine. In other cases it seems to give little trouble as a general rule, though in very young children it may produce difficulty of breathing and swallowing. The ulceration which is sometimes found is probably caused by the accompanying catarrh. That it is contagious is shown by its rapid spread in large foundling asylums, and by direct experiment. Its transference from one mouth to another in such localities is easily understood

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when we consider their customs—the nipple taken from one child and given to another, feeding various children with the same spoon, and so on. How it appears in sporadic cases also is not difficult to explain, believing as we do that it is an ordinary form, which may grow on many substances, and be transported in the form of its sporules in all directions by the air.—Nothing more than a sketch can be given of the various diseases caused by these parasites, and their treatment must be entirely omitted. For convenience sake they may be divided into the 3 following groups: those of the alimentary canal, of the scalp, and of the skin. In the first we place the *oidium albicans* already described, and here too belongs the *torula cerevisiæ*, or yeast plant, its near relative, which is met with occasionally in all the fluid excretions of the body. It forms the ordinary cholera fungus in the vomitus and intestinal discharges of this disease, and is often found in the stomach and attached to the walls of the intestine after death. Its usual presence in fermenting fluids has led to the belief that it was the cause of such change, and we know that when added as yeast it acts as a true ferment; but we do not know but that the peculiar chemical change may offer merely the conditions for its sudden appearance and rapid growth. It is another form of the *penicilium glaucum*. Another plant, found most commonly in the fluid of the stomach, is the *merismopœdia* (or *sarcina*) *ventriculi*, which has been usually placed among the algæ. It has been found also in the urine, in the intestinal canal, and in the lungs. Its presence in the stomach of man probably causes no symptoms whatever; and Hasse's pretended dyspepsia attributed to this parasite is without any foundation, for it has been cultivated in the stomach of rabbits, and no trouble caused by its presence. It is supposed to be present most frequently in patients suffering from some gastric disease, organic or otherwise, but this is to be accounted for by the fact that such only vomit, and afford material or stimulus for investigation. If we remove from our teeth the yellowish white deposit which collects after the neglect of the tooth brush for several hours, we shall find by microscopic examination, in addition to the detritus of food, a cryptogamic plant called *leptothrix buccalis*. It is to be found in all persons, however cleanly they be, and forms a large part of the tartar which collects about the teeth. It grows with great rapidity after eating sugar, and has been seen in the stomach. Of the parasites of the scalp, the *achorion Schönleinii* is most of all to be dreaded, on account of the deformity and disagreeable odor it gives rise to. It produces the disease known as *favus*, *porrigo favosa*, or *tinea lupinosa*. The spores first settle upon the epidermis of the head, and send forth the mycelium, which penetrates the hair follicles and finally the whole course of the hair itself. The hair becomes pale and lustreless, breaks easily, and is surrounded at its base by concentrically marked yellow and roundish crusts, which smell vilely, and consist of spores and mycelium. From one point this fungus may spread over the whole scalp, producing baldness and scars. Fortunately it is of rare occurrence, for a cure is almost impossible. The *tricophyton tonsurans* and *T. sporuloides* also cause baldness when they attack the hair, and the former produces the disease called ringworm which is so prevalent in asylums for children. The *microsporon Audouini* likewise attacks the hair, and the *M. mentagrophytes* the beard. The only vegetable parasite which is found upon the skin alone is the *M. furfur*, which is the cause of the eruption which is known as *pityriasis versicolor*. Several of the above-mentioned species may take root upon the skin as well as the scalp, but they never form a well marked disease like the latter. Various kinds of cryptogamiæ have been observed in other situations, as within the ear, eye, lungs, and nails, but the descriptions of them are very defective, and we hardly know where they belong. It is probable, however, that they are species of fungi which have accidentally found a favorable place for development.—Man, however, is not the only animal infested by the vegetable parasites. Upon the mammalia it is true that few have been observed, but this remains an almost unexplored field to future investigators. Many birds bear them in their respiratory apparatus, especially the owls, which inhabit damp and shady retreats, frequented by fungi. More curious is it to find within the close-shut cavity of an egg mycelium spreading throughout the contents, and changing them by a peculiar chemical action. Here the upholders of the theory of spontaneous generation thought to have demonstrative proof of the justice of their views. The phenomenon, a rare one, is produced by the admission of spores within the oviduct before the egg shell is formed. Fish are often taken covered with vegetable growths, which impede their motion through the water as the barnacles act upon ships. A great many species have also been described which are found only upon their gills and in the cellular tissue. In an aquarium, whenever an injury happens to any of its inhabitants, the wounded surface is seen at once to be covered with fungoid growths, which often attain a large size. But it is the insect tribe which suffers most from this cause; for their diminutive size is little able to cope with the parasite, which when once fastened increases at their expense, till it exceeds them in size and destroys them. Flies may be seen at certain seasons struggling through the air with long stems attached, the mycelium of which spreading inward stops their breathing tubes. Certain species of *sphæriæ* grow within the larvæ of insects in China and Australia, and completely mummify them, so that they resemble twigs of wood, from which sprout forth branches. The most important of all, however, in an economic point of view, is the *botrytis bassiana*, which is so destructive to the silkworm. This

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disease is called muscardine. The spores enter the air tubes of this worm, sending their mycelium through its tissues, and always cause its death. After this the plant pushes its fruit-bearing stems into the outer world, and converts its victim into a mass of mould, from which fresh spores are sent off to spread the disease. Although it only attacks the larvæ, it may by inoculation be cultivated upon the chrysalis and moth. The intestines of insects and worms which live in decayed wood are often found filled with most curious forms of vegetative life, as Dr. Leidy has shown in the case of the *iulus terrestris*, and the very entozoa which dwell within their intestines are covered with similar growths.—Those who would pursue this subject still further will find much to interest them in the following works: Robin, *Histoire naturelle des végétaux parasites* (2 vols, 8vo., Paris, 1853); Küchenmeister, "Manual of Parasites," translated by the Sydenham society (2 vols. 8vo., London, 1857); Berkeley, "Introduction to Cryptogamic Botany;" and Leidy, "Flora and Fauna within Living Animals," in the "Smithsonian Contributions to Knowledge," vols. v. and vi. (Washington, 1853 and '54).—The term EPIPHYTES is also applied by botanists to plants which grow upon other vegetables, but which do not derive their nourishment from them. (See AIR-PLANTS).

EPIRUS, next to Thessaly, the largest province of ancient Greece, in the S. part of modern Albania, bounded N. by the territory of the Græco-Illyrian tribes, E. by Thessaly, S. by Ætolia, Acarnania, and the Ambracian gulf, now gulf of Arta, and W. by the Ionian sea. The Ceraunian mountains separated it from Grecian Illyria; the Pindus, famous in mythology, from Thessaly. Its climate was mild, its soil less fertile than that of other parts of Greece. The river Acheron received the waters of the Cocytus within its limits, and flowed into the Ionian sea. Both rivers figure in mythology as streams of the infernal region. Epirus was divided into the districts of Chaonia, Molossis, and Thesprotia, named after the most numerous and powerful of its ancient tribes. Its most remarkable places were: Dodona, with the ancient oracle of Jupiter, with its prophetic rustling tree, sacred grove, and splendid temple; Canopo and Buthrotum, with harbors, chiefly communicating with the port of Brundusium, now Brindisi, in southern Italy; Ambracia, the capital of King Pyrrhus and his descendants, on the gulf of the same name; Nicopolis (city of victory), on the same gulf, founded by Octavianus Augustus, in commemoration of the battle of Actium, near the opposite shore. The Epirotes had their share in Grecian fame and history, though the other Greeks did not consider them as belonging to the Hellenic race. Pyrrhus or Neoptolemus, the son of Achilles, became king of Epirus after the Trojan war. Olympias, the mother of Alexander the Great, was a princess of this country. But their most distinguished man was King Pyrrhus (295–272 B. C.), who, in spite of the wise remonstrances of his chief minister Cineas, destroyed his armies and ruined the state, in brilliant campaigns against the Romans and others. Oppressed by the neighboring Macedon, the Epirotes were delivered by their ancient enemies, the Romans, but proved faithless to their deliverers. They supported against them both Antiochus the Great of Syria, and Perseus of Macedon. They were subdued by Paulus Æmilius (168 B. C.), and cruelly chastised. Numerous cities were destroyed, and 150,000 of the inhabitants were sold into slavery. Epirus was now a province of Rome, and shared the fate of its eastern dependencies. In 1432 it was conquered by the Turks, from whom it was wrested in 1443 by the famous Scanderbeg, prince of Albania. On his death in 1466 it was reconquered by Mohammed II., and has since been ruled by Turkish pashas, among whom, in the early part of the 19th century, Ali of Janina distinguished himself by his crimes, talents, and revolts against the authority of the sultan. The insurrection of the Suliotes, in southern Epirus, ended in their own ruin. As volunteers they promoted the independence of Greece without achieving their own. The modern inhabitants of Epirus are mostly Arnants.

EPISCOPACY, that form of church government in which bishops are established as chief rulers of the ecclesiastical body, superior to priests or other clerical officers. (See BISHOP, CLERGY, ENGLAND (CHURCH OF), EPISCOPAL CHURCH (PROTESTANT), METHODISTS, ROMAN CATHOLIC CHURCH.)

EPISCOPAL CHURCH, PROTESTANT, in the United States, that ecclesiastical body which claims to be an offshoot from the church of England. Previous to the American revolution members of the church of England were constantly settling in all parts of the colonies. In Maryland especially they were very numerous, and in 1692 they seem to have constituted a majority of the population sufficiently large to establish their religion as the religion of the colony. In accordance with the traditional views of the mother church, they held to the necessity of the episcopal office in order to give validity to certain of the ecclesiastical functions. No bishop, however, was provided for them until after the peace of 1783. Up to that time the Episcopal church in this country was under the oversight of the bishop of London, and American candidates for the ministry were under the necessity of crossing the Atlantic in order to obtain orders. Efforts had indeed been several times made in the old country to secure an episcopate in the colonies; but these efforts were always defeated by a twofold influence. There was in England an unfriendly feeling toward the measure, for the most part growing out of certain political complications; and there was in the colonies a good deal of jealousy of episcopacy, arising from the experience of the connection between church and state in the mother country. Bishops without lordly titles and princely in-

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comes, and authority in part at least of a political character, were unknown, and by many believed to be impossible. It is also affirmed that, especially in New England, a fear that if the colonial dependency of our country on the crown of England should be much longer perpetuated, the establishment of an episcopate like that in England would be inevitable, contributed much to the zeal which characterized the struggle for American independence. In this state of things, as was natural, when the war had actually broken out, some of the church of England people, and more especially those of the northern states, were opposed to it, and became what were called tories; while others, and especially those in the southern states, heartily espoused the cause. Washington himself was a church of England man before the revolution, and after the treaty of peace he remained and died in the communion of the Protestant Episcopal church. Mr. Duché, the first chaplain to congress, was a church of England clergyman; and Bishop White of Pennsylvania, the first presiding bishop, was from the first an ardent friend of American independence. As early as Aug. 1782, a plan had been proposed for a union and organization of "the church of England people" into an independent branch of the church of Christ. No organization, however, was completed until Sept. 1785; but before this the Episcopalians of Connecticut elected the Rev. Samuel Seabury, D.D., to be their bishop. Dr. Seabury, in consequence of some political obstacles to his getting his ordination in England, went to Scotland, and was consecrated, Nov. 14, 1784, by 3 Scottish bishops, Robert Kilgour, Arthur Petrie, and John Skinner, at Aberdeen. The general convention, however, which met in 1785, made application to the English church for the consecration of more bishops of the American church. For this office Dr. William White of Pennsylvania and Dr. Samuel Provoost of New York had been designated and elected, each respectively by the parishes in the states to which they belonged. They were consecrated in the Lambeth palace chapel, Feb. 4, 1787, and on Sept. 19, 1790, James Madison of Virginia was in like manner consecrated for the American church in Virginia. In 1789 the general convention met, consisting of the then bishops (although Provoost took little or no active part in its doings), and clerical and lay delegates from each of the states in which any diocesan organization had been effected. At this meeting a constitution and laws for the organization and government of the church as a provincial branch of the catholic church of Christ were adopted. The English prayer book, as revised and adapted to the altered political circumstances of the country, was set forth to be used in all the congregations after Oct. 1, 1790, and it remains unchanged to the present day. In the alterations thus made in the English formularies, it is declared that "this church is far from intending to depart from the church of England in any essential point of doctrine, discipline, or worship, or further than local circumstances require." And it has been held that in consequence of this declaration in the preface to the American prayer book, as well as on general principles, the Protestant Episcopal church in the United States retains all the common and canon law of the English church, except in so far as "it may have been deemed inapplicable by its local circumstances," referred to in the preface, or modified or repealed by express legislation. The Protestant Episcopal church in the United States retains from the church of England the Apostles' and Nicene creeds, the XXXIX. articles, with a slight modification in reference to the connection of the civil government with the church, and the catechism and baptismal offices. But for the communion office it has rather followed the Scotch than the English church in placing a prayer of consecration and invocation of the Holy Ghost upon the consecrated elements before the administration of them to the communicants, and has even added to the Scotch service a few words making still more unambiguous the eucharistical character of the sacrament. The American church has also stricken out from its form for visiting the sick the formula for private absolution; and in the exhortation preceding the administration of the holy communion, it has omitted the direct reference to and advice in favor of private confession to the priest, and absolution from him. In this revision of the offices, Bishops Seabury and White were chiefly instrumental as the guiding minds, and Bishop White has left behind his testimony to the harmony and agreement of views and feelings with which they coöperated in the performance of this task. In the offices of institution, established in 1804 and set forth with alterations in 1808, the word "sacerdotal" is introduced as describing the functions of the Christian ministry. This is regarded as significant and giving definitiveness to the view taken of the nature and offices of the Christian ministry in this branch of the church. The theory of the Protestant Episcopal church, like that of the English church, is that in order to be a valid branch of the church of Christ it must have the Holy Scriptures and the ancient catholic creeds, the ministry in an unbroken line of succession from the apostles, and in the exercise of lawful jurisdiction; and that the Christians of any nation with these conditions constitute a national branch of the church of Christ, totally independent of the jurisdiction and authority of any foreign church or bishop, subject only under Christ to the authority of the universal church in general council assembled; and that as such they have jurisdiction over all their members and authority in matters of faith to interpret and decide, and in matters of worship and discipline to legislate and ordain such rites and ceremonies as may seem most conducive to edification and godliness, provided they be not contrary to the Holy Scriptures. The Scriptures and the creeds, as already said, the Prot-

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estant Episcopal church has; the ministry also it has obtained through the ministry of the English church, and preserves in accordance with the ecclesiastical canons and usages which have prevailed from the days of the apostles. Its right to lawful jurisdiction must stand on circumstances and facts peculiarly its own, and found in its history and condition. In the first place, it was planted by members of the English church, and in what was then, and continued to be until the American colonies became an independent national sovereignty, a part of the English dominions. The settlers of Jamestown came, in the language of their charter, to "discover and to prosecute effectually the full possession of all such heathen lands as were not actually possessed by any Christian prince or people," and "to establish there both the dominion of the British crown and the jurisdiction of the English church, provided always that the statutes devised should be, as near as conveniently might, agreeable to the laws and policy of England, and not against the true Christian faith, as professed in the church of England." They remained a part of the English church so long as the colonies remained a part of the English dominions and dependencies. Holding with the English church that episcopal ordination is necessary to valid jurisdiction and the due administration of the sacraments anywhere, the Protestant Episcopal church has disregarded the organizations of the various Protestant denominations in the country, as none of them have what she regards as a valid episcopate. She does, however, acknowledge the validity of the orders conferred in the Roman Catholic church, but disregards the claim of her ministry to jurisdiction within the United States. This would follow from the fact of her first institution in this country, being planted here not only before the Roman Catholics had made a permanent settlement, but by the English church, and in territory which it is claimed at that time belonged to its jurisdiction. In this state of facts the Protestant Episcopal church has always regarded the Romish clergy as schismatics and intruders, possessing no right to jurisdiction until such time as they shall conform to the doctrine, discipline, and worship of the Protestant Episcopal church, and submit to her authority.—The dioceses of the Protestant Episcopal church correspond in number and extent with the states, except that New York has two, and others are fast being organized in the territories. The church has missions in Africa, China, and Greece. It has 39 bishops, including the missionary bishops, over 2,000 clergy, and about 200,000 communicant members, and includes a population estimated at about 2,000,000. In each diocese there is an organized convention consisting of bishop, clergy, and lay delegates chosen by the people. These conventions meet annually, and provide for all the details of local and specific legislation. The dioceses are organized into a general convention, which meets once in 3 years. It consists of all the bishops in the actual exercise of episcopal jurisdiction, and of clerical and lay delegates, 4 of each order chosen from each diocese by its convention. They sit in 2 houses, and not only is the concurrence of both houses necessary for the passage of any canon or law of the church, but also a concurrence in case it is asked of each of the 3 orders, bishops, priests, and laity, in order that any measure may become a law and so binding upon the church. The contributions in money for church objects, over and above what was expended in erecting and repairing church edifices and in the support of the parochial clergy, amounted in 1858 to $1,273,479 91. This sum was almost wholly expended in support of the poor, and in sustaining the missions, diocesan, domestic, and foreign. In consequence of its total disconnection from the state and political complications, the Protestant Episcopal church has had a degree of unity, harmony, and peace, unknown to the mother church in England, and its increase by a comparison of statistics shows a gain in numbers of 20 or 30 per cent. above the increase in the population of the country since the time of its organization.

EPISCOPIUS, Simon, a Dutch theologian, whose original name was Bischop, born in Amsterdam, in 1583, died there, April 4, 1643. He was educated at Leyden, receiving theological instructions from Gomar and Arminius; and his attachment to the Arminian system exposed him to the enmity of the then dominant Calvinistic party. In 1610 he became a pastor in a village near Rotterdam, and in 1611, notwithstanding his youth, he was chosen one of 6 ministers who were to defend Arminianism in a conference appointed by the states-general. In 1612 he was invited to fill the chair of theology at Leyden, which Gomar had just quitted. He now became the object of unceasing attacks, and was accused with equal injustice of being a Socinian, and of having combined with the Catholics to ruin Protestantism; and the popular animosity, so easily excited in religious causes at that era, became directed against him and his family. In 1618 the synod of Dort was called, and Episcopius with some of his friends presented himself before that assembly. But Maurice of Orange, under whose auspices the synod was held, was opposed to partisans who preached at the same time civil and religious liberty, and the Arminians found themselves excluded from taking any other part in the conferences than that of answering questions. Episcopius then vainly took up his pen to defend his faith; the Arminian or remonstrant clergymen were deposed, and as they refused to renounce for the future the performance of pastoral duties, they were banished. Episcopius lived in retirement in Brabant and France till 1626, when, more tolerant principles having prevailed in Holland, he returned thither, preached at Rotterdam, and after 1634 taught theology in the new college established by his friends in Amsterdam. To Arminius belongs the distinction of having founded the sect, but

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Episcopius was the theologian who first developed its ideas with skill. Beside his many controversial pieces, the most important of his writings is the *Institutiones Theologiæ*. A collection of his works was published by Courcelles (2 vols. fol., Amsterdam, 1650).

EPISTOLÆ OBSCURORUM VIRORUM (letters of obscure men, the word *obscuri* being intended to mean at the same time ignorant and illiberal persons), a collection of satirical letters in dog Latin, published anonymously in 1515 and 1517, the first part at Hagenau, by the learned publisher Angst, the second at Basel by Froben, though Venice is named on the title page as the place of publication. These letters are conspicuous in the history of the reformation in Germany. At that time John Pfefferkorn, a converted Jew, and Jacob Hoogstraaten, were foremost among those in Cologne who endeavored to keep down the light of independent thought developed by the study of the classics. A violent literary feud between them and the liberal thinkers, Reuchlin especially, caused the publication of the *Epistolæ*, a keen and caustic satire on the ignorance and perversity of the clergy at that time. There was much uncertainty in regard to their authorship. Reuchlin, Erasmus, and Ulric von Hutten were severally supposed to have been the authors. But careful investigation has shown that there was a large number of contributors, including Ulric von Hutten, Herman van den Busche, E. Hess, Peter Eberbach, Rhegius, Sommerfeld, Cæsarius, Pirkheimer, Wolfgang Angst, and Jacob Fuchs, for the first volume, and beside them, Herman van Nuevar and F. Fischer for the second. The *Epistolæ* were prohibited by the pope in 1517, in consequence of which their popularity increased. The book has been frequently republished. The best editions are those of Frankfort (1643), London in 12mo (no year given), that edited by Maittaire at London (1710), a new edition by Rotermund (Hamburg, 1827), another by Münch (Leipsic, 1827), and the latest by G. Böcking (Leipsic, 1859). The latter includes also a 3d volume, published for the first time in 1689. The satirical form of the *Epistolæ* has on several occasions been imitated by more modern authors. One of these imitations is *Epistolæ Novæ Obscurorum Virorum*, published by Prof. Schwetschke, at Halle (1849), as a satire on the German parliament.

EPITHELIUM (Gr. ἐπι, upon, and θηλη, a nipple), the layer of cells lining the internal free surfaces of the body, continuous with the epidermis which covers the external surface of the skin. It arises from cells like the epidermis, which are developed and thrown off in the same manner in both structures; the epithelium, however, serves for totally distinct purposes in the animal economy, as from the soft and moist surfaces covered by its cells are elaborated the various secretions of the body. A continuous layer of its cells may be traced the whole length of the alimentary canal, along the other mucous membranes into the glands and follicles, on the serous and synovial membranes and the coats of the blood vessels and absorbents. The two principal among the numerous forms of epithelial cells are the tessellated or pavement epithelium, and the cylindrical epithelium. The tessellated epithelium lines the serous and synovial membranes, the blood vessels, the follicles of most of the cutaneous and mucous glands, and many parts of the mucous membranes; the cells are generally flattened and polygonal, forming by their contact a kind of pavement, and the number of layers is usually small. The cylinder epithelium covers the mucous membrane of the alimentary canal, the larger ducts of the glands, the vas deferens, and the urethra; its cells are cylinders, arranged side by side, one end resting on the basement membrane, the other forming the free surface. These two kinds pass into each other at various points, giving rise to various transition forms, and both are often fringed with delicate filaments or cilia, varying in length from $\frac{1}{75.000}$ to $\frac{1}{2.500}$ of an inch. (See CILIA). Ciliated epithelium is found in the cerebral cavities, the ramifications of the bronchi, the air passages, with their nasal, frontal, maxillary, and lachrymal appendages, the posterior faucet, and Eustachian tube; their function seems to be to expel the secretions of these various membranes. The epithelial like the epidermic cells are in a state of continual separation and renewal, more rapid according to the activity of the connected function; the introduction of nutrient matters, the separation of effete substances, the various products of secretion, and the development of the reproductive particles, are effected by the agency of epithelium cells.

EPIZOA (Gr. ἐπι, upon, and ζωον, an animal). This term as used by Owen signifies only a singular class of humbly organized articulate animals, which infest the skin, gills, and eyes of marine animals. We shall give it, however, a much more comprehensive meaning, and describe under it the most important of the external parasites of the animal kingdom. They all belong to the order *articulata*, and to the classes *crustacea*, *arachnida*, and *insecta*. Beginning with the first of these divisions, we shall find that, like the entozoa, many of them possess limited powers of locomotion, and consequently must pass the whole term of their existence upon the animals they infest; but that as we ascend in the scale of organization, and come to the arachnida, and especially the insecta, there is no longer this dependence upon a fixed position for sustenance and habitation, and that, more independent of the will of others, they only make use of their hosts for accidental nourishment, or compel them to take charge of their young while in a helpless condition. We shall consider the most important of them in the order of this classification, referring for their anatomy and general description to the articles respectively devoted to these classes. I. *Crustacea*. The parasitic representatives of this class are confined to the pœcilopodous entomostraca, and

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are found only upon marine animals, being in fact the substitutes for insects, which cannot live beneath the water. These are again subdivided into the *lerneadæ* and the *siphonostoma*, which together formed Owen's class of epizoa. The former of these have for a long time puzzled the naturalist on account of their peculiar appearance. Aristotle and Pliny described them; Linnæus placed them among the mollusca; De Lamarck removed them to the annelides; and Cuvier arranged them among his intestinal worms. The form of these animals is very various and fantastic, but they are mostly of an elongated shape, with tubular necks of a horny consistency, at the end of which is the mouth armed with sharp implements, by which they attach themselves to the eyes, gills, and flesh of fishes, and suck their blood. The females have long plumose appendages attached posteriorly, which are the ovaries. The males are imperfectly known. The young, when first hatched, are of an oval shape, and possess natatory limbs, by aid of which they seek their proper host, and which, when this object is accomplished, are either transformed by metamorphosis into grasping organs, or are lost. They are often found in great numbers attached to the same fish, and some are even 6 or 8 inches long. They occasionally excite even the largest sword or sun fish to such a state of desperation by the torments they inflict, that they dash themselves upon the beach. They inhabit both fresh and salt water. The *siphonostoma* are of a higher order. They have an oval, flattened body, which is partially protected by a hard shield or carapace, and are provided with 3 or 4 pairs of feet armed with sharp claws, by means of which, and sucking disks, they fix themselves to the skin of fishes, and soft parts of crustacea and other aquatic animals. Particular species generally infest particular fishes; and as scarcely any fish is free from them, we may thus form an estimate of their numbers. They move with considerable rapidity over the body of the fish, and may leave it for another host. The *caligi*, of which as many as 30 or 40 have been removed from a single codfish, are generally found on weak or diseased fishes on the parietes of the mouth and bronchial cavities, but are unable to suck their blood. Fishermen call them fish lice. The *cyamus* is sometimes found in such numbers upon the whales of the southern ocean, as to entirely strip them of their epidermis, and to produce a white color recognized at a considerable distance. None of the crustaceous parasites are ever found on terrestrial animals. II. *Arachnida*. In this class, nearly allied to the insects, we find a body divided into two principal parts, viz., cephalothorax and abdomen, and provided with 4 pairs of legs. The abdomen may be subdivided into several segments. The only parasites belonging to it are included in the order *acarina* or mites. These are minute animals, in which the head, thorax, and abdomen are blended in one oval mass. In their immature state they have but 3 pairs of legs; the 4th they acquire later. Before taking up the true mites, however, it will be best to describe briefly two genera which are found on man, viz.: *linguatula* and *demodex*. The first, sometimes called *pentastomum*, has an elongated, cylindrical body, made up of alternate rings and constrictions, and is about half an inch in length. Its head is armed with two large hooks resembling the thorn of a rose bush. It is found enclosed in cartilaginous or calcareous cysts on the surface of the liver in negroes. Another species (*L. ferox*) is now and then met with in *post mortem* examinations encysted on the surface of the liver of whites, but is still oftener found in the frontal sinuses of the herbivora and dogs. The *demodex folliculorum* bears also the generic names *acarus* and *steazoon*, and is the pimple mite or dweller in the follicles of the human nose. As long ago as the middle of the 17th century it was known that an animal inhabited the comedon, but not until 1842 was the subject investigated, by Henle and Simon at the same time. The head of this microscopic parasite is separated from its body by a half-moon-shaped constriction, and is furnished with a double-jointed papilla armed with sharp hooks or saws. The 4 pairs of legs are short, and consist of 3 joints which move with difficulty, and are tipped according to some authorities with 3 claws, to others with but one. Several forms are met with owing to difference of age and sex. First we see one, the lizard-like tail of which is 3 times the length of the body. The contents of this extremity are granular, and of a dark color, consisting of fat globules. In another form the shape is nearly the same, but the whole animal is smaller, and has but 3 pairs of legs; this is undoubtedly immature. Still a third presents itself with a body like that first described, but with a hinder extremity no longer than the body, and of a pointed, conical form, displaying transverse chitinous rings. It seems much more plausible to consider this the male, than to suppose that the tails of the former varieties eventually drop off or shorten. No definite internal structure has yet been made out. Wedl and some other observers think they have made out within the body of the female, and in the field, immature forms without extremities; and if this be true, they are viviparous. They are found generally in the hair follicles of the nose of thick and fat skinned persons, but may be met with on the breast or back, or wherever comedones and acne occur, of which, when present in numbers, they may be the cause, although generally they occasion no trouble. They are usually found with their hinder extremity next the surface, and either close to the hair, or in the canals of the fat glands, upon the secretions of which they live. Their occurrence is very general, and to find them, we have only to squeeze the follicles on the sides of the nose between the finger nails, and to add to their contents beneath the microscope a drop of oil, by which

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the sebaceous matter is rendered clear. In the dead body they will be found much more deeply seated, as if they had sought warmth by penetrating toward the centre as the periphery became cold. The *acarus*, or *sarcoptes scabiei*, or itch insect, will be fully considered in the article Itch, and may therefore be passed by without further notice here. Still other forms of acari or sarcoptes are sometimes met with on man, transferred to him from the beasts on which they live. Their occurrence, however, is purely accidental, and they are never known to reproduce in such situations. The eruption they cause may, it is true, be of long continuance, but only because fresh infection takes place by continued contact with the animals affected. The sarcoptes of the various domestic quadrupeds produce upon them the disease known as mange, and are specifically different. The mite of the cat and lion, however, resembles and is probably identical with that of man; so that it is a question whether these lower creatures got their itch first from their noble master man, or *vice versa*. The parasite of the horse is large enough to be visible to the naked eye, and its mode of burrowing and of reproduction is nearly the same as that of the *sarcoptes hominis*. It produces a dry scaly appearance of the skin, which is sometimes called "scratches." The cheese and dried-fruit mites may likewise live for a short time on the skin, but cause nothing more than a passing irritation. The family of *ixodes*, or ticks, is also a great plague to man and beast. They live on moss and dry foliage, on sunny hillsides, and in groves and thickets, and never fail to attack grazing cattle and passers by. They bore into the skin with their sharp proboscis armed with horny barbs, and remain hanging till the body, at first minute and flat, becomes swollen with blood, even to the size of a bean. To tear them away is impossible on account of their recurved barbs, and great caution and patience is necessary; for if violence is used, the head remains behind, and causes inflammation of the part, which may last for months. Generally long and gentle rubbing with some essential oil will make them quit their hold voluntarily. They lay a vast number of eggs, and their multiplication upon oxen and horses is sometimes so great that the animals die of exhaustion. The *gamasida*, beetle lice, are other mites parasitic on birds, reptiles, and insects, and both land and water beetles are sometimes found covered with them. The *dermanyssus avium* abounds in great quantities in bird cages and hen houses, and lives upon the blood of their inhabitants. Numerous cases are on record of their presence in great numbers on persons who frequent such localities, penetrating and living beneath the epidermis. They produce the disease occasionally met with among the wretched and filthy sick of the poor, called *acariasis*. Colonies of mice are often infested with similar parasites. Another mite similar to the ixodes is the *leptus autumnalis* of Europe, which, living in grass or grain or upon fruit bushes, gets upon the reapers and passers by, and causes pustules and sores by the inflammation it excites. It is of a red color, whence the name of the disease, *rouget*. A similar parasite is the *bête rouge* of Martinique, which often renders necessary amputation of the soldier's limbs it infests. III. *Insecta*. In discussing this division, we shall consider the parasitic insects of animals in order, beginning with those of the mammalia. The human body serves as a residence for several of these, the best known and most numerous of which are the *pediculidæ*, or lice, which belong to the apterous *ametabola*, or wingless insects without metamorphosis. Of these, 4 are peculiar to man: *P. capitis*, *P. vestimenti*, *P. tabescentium*, and *phthirius pubis* or *inguinalis*. The color of the head louse is a grayish white, and it is supposed to adapt itself to the color of the hair of its host. The males are smaller and less numerous than the females. The eggs, which are bean-shaped, cling to the hair as soon as laid, probably by means of some glutinous matter secreted by the female. After remaining as nits for 6 days, the young emerge, and at the end of 18 days more are capable of reproducing. Each female can deposit 50 eggs in all. The presence of lice is easily detected, for we may see them with the naked eye, and their eggs attached to the ends of the hair cannot escape detection. Even when the old are at work beneath the disgusting disease they create, the females creep forth to deposit the nits upon the fine ends of the hair, perhaps because too great heat is prejudicial. A mere itching is the first symptom of lice, which leads in simple cases to scratching and slight excoriations of the scalp. Let heads so infested, however, remain for months uncombed and uncared for, and such cases will result as are often seen in European hospitals. A specimen is brought in with hair all matted together in flakes, and looking as if sand and molasses had been poured upon it and dried. The stench emitted is loathsome and sickening. On raising the hair a frightful mass of filth, pus, scabs, and lice is visible. The scalp is found covered with crusts of blood, with open ulcerating sores, and with thick and elevated scabs, from beneath which on pressure pus flows freely. The ears, too, may be converted into a suppurating surface. The *P. vestimenti*, or body louse, is much larger than the preceding species. The head is longer, and its color dirty white. This animal is seldom if ever found on the body, but inhabits the seams and folds of clothing next the skin, where it deposits its eggs. Its bite causes the same itching as that of the *P. capitis*, but the results are different. The scratching brings on papules, which become excoriated, and eczema appears. The clothes adhere to the skin, which brings on exudation, and lastly pustules appear. In some cases constant scratching produces such a hyperæmia, that a deposition of pigment follows sufficient to color the whole skin like that of the negro. The *P. tabescentium* of writers

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has longer antennæ and a larger and more distinctly separated thorax than the two preceding species, and an indistinctly ringed abdomen. It inhabits the skin itself, living in its fold beneath the epidermis, and produces the disease called *phthiriasis*. Leeuwenhoeck overcame his nature to such an extent as to cultivate a colony on his own leg for a considerable time, and by estimation found that one female might in 8 weeks become the grandmother of 5,000. It is proper to state, however, that some of the best authorities deny the existence of any such species. The *phthirius pubis* is considerably broader, and has a shorter posterior extremity than its relatives. Its legs are long, and the hindermost two are armed with immense claws. It is very slow in its motions, and has no eyes. This species, as its name implies, is found most frequently on the pubes, but occasionally on the beard, eyebrows, and hair of the breast and axillæ, where it bites deeply into the skin, and lives upon the blood of its host. When present in numbers, these parasites cause an intolerable itching, and may be seen sticking firmly to the surface of the body like black specks of coal. Küchenmeister has found on the heads of an Egyptian mummy and a New Zealand savage nits, the claws of which differ somewhat in size from those of the ordinary species. Lice are a world-wide pest, and no nation seems free from them. According to Aristotle, they must have been a great plague among the ancients, and Alcman, Sylla, and Philip II. are reported to have died of them. It is probable, however, that some other parasite, as the mites, was confounded with them.—Rising a step higher among the insects, we come to the *hemimetabola*, or those with an incomplete metamorphosis. In the order *hemiptera* we find the *cimex lectularius* or *acanthia lectularia*. The bedbug has a small head, from which project 2 long 3-jointed antennæ. Behind the compound eyes are situated 2 small transparent flaps covered with bristles, which are the rudiments of wings. The thorax is broad and short, the abdominal segment very large, broad, and flat. The eggs are long and cylindrical, and are furnished with a stem, by which in the spring the female fixes them upon objects. It is of a reddish brown color, and has a very disagreeable odor, which arises from two glands that contain a red and granular matter. This pest inhabits the crevices of beds, walls, and furniture, or wherever it can find a convenient place to conceal itself by day. It will lodge in garments also, but always emerges at night to prey upon the blood of man. Its predatory excursions, however, are not wholly confined to the night, for when present in the clothing they bite as well by day. The skin of some individuals seems quite insensible to their sting, while upon others it causes great local irritation. The black point seen in the centre of the spot is caused by the coagulation of the blood left in the wound. Sometimes a person is literally almost devoured by these creatures, and the whole body may be covered with the eruption they produce. They are found generally wherever man exists, though not in South America, New Holland, or Polynesia.—The flea (*pulex irritans*) belongs to the holometabolous *aphaniptera*, or hopping *diptera*, which undergo a complete metamorphosis. Its head is short and rounded. The eye is simple. The mouth is provided with two 4-jointed palpi, with a long tongue protected above by a short double upper jaw, and a sort of upper double lip or taster, and below by a projecting under jaw. The thorax is provided with 2 pairs of stigmata, and with 3 pairs of legs, the first of which are seemingly situated on the head. The 2 hindermost are composed of many tarsal joints, which are very long, and furnish the means by which its enormous leaps are taken. They are provided also with long double claws. The posterior segment is covered with 10 plates or rings lapping over each other, as shingles on a roof. The color of this parasite is a reddish brown. The male is smaller than the other sex, and the abdomen is flatter and broader. The eggs are oval, white, and covered with a glutinous matter. In 6 days after their deposition, either in dust or beneath the nails, small, worm-like, jointed larvæ without feet creep forth from them. In 11 days more they envelope themselves in a thin cocoon, from which at the expiration of 11 days they emerge perfect animals. It is a disputed point whether the males are parasitic; Küchenmeister argues from the structure of their head that they are not. Little need be said here about the customs of this insect, which in some countries, as Italy, Turkey, and Germany, is such an intolerable nuisance. It bites all the time, day and night, and is never satisfied. Its bite, though productive of more itching, does not cause the great irritation the *acanthia* produces. Their horny covering or mail protects them from being crushed except by a wonderful degree of pressure, and their alert senses enable them to avoid the hunter's hand, unless it be a skilful and experienced one. The *pulex penetrans*, or chigo, jigger, or sand flea, as it is variously called, is smaller than its relative, and has a proboscis longer than its body. It is found only in the West Indies and tropical regions of South America. It inhabits the sand and chinks in the stalls of animals, and it is only the impregnated female that is found on man. She bores deeply into the skin in order to deposit her eggs, and as soon as an attachment is obtained her hindermost segment swells up in a wonderful manner beneath the skin, so that the thorax and head appear as appendages to a bladder of the size of a pea at times. This sac contains the eggs or larvæ, which, if the sac is broken during removal, are scattered through the tissues, and give rise to troublesome ulcers, which may at times necessitate amputation. Its presence causes much pain, and its removal uninjured may be effected simply with a needle, as soon as the swelling takes place.—We have

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still to mention several forms of insects, the larvæ of which are occasionally found either in or on some part of man, but they are to be looked upon more as an accidental occurrence, and as such need only be alluded to here. The larvæ of some unknown *œstrus* are sometimes met with beneath the skin. They form pimples from which flows a moisture, while around them the skin is red and painful. Humboldt met in his South American travels Indians with large parts of their exposed bodies thus affected. In the intestinal canal the larvæ of *anthomyia scalaris* and *canicularis* are sometimes found. The *musca vomitoria*, or bluebottle, sometimes deposits its larvæ in open cavities of the body, as the ear, eye, or wherever else moisture and heat are found. The common flesh fly, *M. cænaria*, and the *M. domestica*, also deposit their eggs at times in hot weather either on open wounds or moist places of the body, and cause the appearance known as "live sores." The larvæ are sometimes deposited in a highly developed condition, so that they become maggots even in a few hours. Quadrupeds also are infested by lice, almost without exception each by one peculiar to itself, though sometimes one species is known to live upon several animals of the same genus. They increase with great rapidity upon such beasts as are kept in dirty stables, seldom cleaned, and poorly cared for, and most frequently are seen upon old horses. They cause irritation, roughness of skin, and loss of hair, in consequence of the disposition of their hosts to bite and rub the affected parts. Fleas too abound upon several animals, and are distinct species in most instances. But the most frequent and troublesome pests of the herbivora are various *œstri* or breeze flies. The *œstrus* peculiar to the horse, for instance, produces the well-known disease called bots. (See Bots.) Another species, *Œ. ovis*, deposits its eggs in the nostrils of sheep, usually about half a dozen in each individual. The larvæ are soon hatched, and creep by means of their 2 anterior hooks upward into the frontal and maxillary sinuses. There they remain until ready to undergo metamorphosis, when they fall out, gain their wings, and repeat the same process. The larvæ are composed of 12 segments beside the head. Sheep fear these flies greatly, and often huddle together with their heads close to the ground to avoid them. The symptoms of their presence are sneezing and a discharge of glairy mucus from the nostrils, but they seldom do serious injury. The *Œ. bovis* lays its eggs on the backs and sides of oxen and cows. The larvæ, hatched by the heat, penetrate the skin, and by increase of size form tumors as large as pigeon's eggs. They live upon the pus their presence produces. After a time they make a larger aperture, and, creeping out, seek a proper place in which to become chrysales. The fly when discovered creates a great panic among cattle, and drives them often frantic to the nearest pool. Birds, too, are nearly all infested by lice, each species generally supporting its own species of parasite, and sometimes more, which lives upon the feathers and blood of its host. Insects also, fortunately, are made a dwelling place by other insects, and thus their rapid growth and the consequent destruction of vegetation held in check. Ichneumon is the name given to these unnatural parasites. They are small flies with slender bodies, and there are many species known, probably as many as there are of caterpillars and moths. The female deposits her eggs in the larvæ, pupæ, or eggs of other insects and spiders. When she has found her proper host, a caterpillar for instance, she seizes it, and deposits her egg in the skin behind the head. The larva, soon emerging from the egg, eats its way along within the caterpillar, avoiding those parts essential to life, and by the time the latter has become a chrysalis the former is nearly mature. It lies quiet for a time to undergo metamorphosis, and awaking once again a perfect animal, bores its way out from the cocoon of its murdered host, and flies forth in quest of fresh victims. Thus it is that nature keeps in check its most destructive creatures by means so insignificant and unseen.—For fuller information on the crustacean epizoa, see Roussel de Vauzème, *Sur le cyamus ceti*, in the *Annales des sciences naturelles* (Paris, 1834); Burmeister, *Beschreibung einiger neuen oder weniger bekannten Schmarotzerkrebse*, in the *Novæ Actiones Naturæ Curiosorum*, vol. xix. (Berlin, 1835); Köllar, *Beiträge zur Kenntnis der lernäenartigen Crustaceen*, in the *Annalen des Wiener Museums der Naturgeschichte*, vol. i. (1835); Dana and Pickering, "Description of the *Caligus Americanus*," in the "American Journal of Science," vol. xxxi., p. 235; Baird, "British Entomostraca" (Ray society, London, 1850).—For arachnida and insecta, see Bracy Clark, "Observations on the Genus *Œstrus*," in the "Transactions of the Linnean Society," vol. iii. (London, 1797); Treviranus, *Ueber den Bau des Nigua*, in his *Zeitschrift für Physiologie*, vol. iv. (1831); Brant and Katzeburg, *Medicinische Zoologie* (1833); Dugès, *Recherches sur l'ordre des acariens*, in the *Annales des sciences naturelles*, vol. i. (Paris, 1834); Burmeister, "Manual of Entomology," translated by Shuckard (London, 1836), and *Genera Insectorum* (Berlin, 1833–'46); Newman, "History of Insects" (London, 1839); Westwood on "Insects" (2 vols., London, 1839), and bibliography therein contained; Denny, *Monographia Anoplurorum Britanniæ* (London, 1842); Dujardin's *Mémoires sur les acariens*, in the *Annales des sciences naturelles*, vol. iii. (1845); Siebold, "Anatomy of Invertebrata," translated by Burnett (Boston, 1854); Wedl's *Grundzüge der pathologischen Anatomie* (Vienna, 1854); Küchenmeister, "Manual of Parasites," translated by the Sydenham society (London, 1857).

EPOCH (Gr. *επoχη*, a fixed point, an epoch), a starting point or era from which to date. (See Chronology.)

EPROUVETTE, an instrument for testing

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the projectile force of gunpowder. It consists of a small barrel of great strength, in which a certain quantity of powder is exploded, and the force exerted is measured by the extension it produces upon a spring, or the distance to which a heavy weight is raised. The effect is also estimated by the distance to which a ball of known weight is thrown from a small mortar by a certain quantity of powder. The French formerly used a mortar for an eprouvette of 7 inches calibre, and the test of the powder was for 3 ounces to throw a copper globe weighing 60 lbs. to the distance of 300 feet.

EPSOM (Sax. *Ebbeham*), a market town of Surrey, England, on the margin of Banstead downs, 15 m. S. W. of London, on the London, Croydon, and Epsom railway; pop. in 1851, 3,390. At one time it seemed destined to become a prominent watering place, in consequence of the discovery of medicinal springs, impregnated with sulphate of magnesia, from which the celebrated Epsom salt was manufactured. The springs are no longer visited, but the town has gained another attraction in the great annual races held during the week preceding Whitsuntide on the neighboring downs. They are attended by 300,000 or 400,000 persons of every class of society, and the grand stand on the race course, erected in 1829–'30, is capable of holding 7,500 persons. The chief excitement centres in the race for the Derby stakes, which takes place on Wednesday.

EPSOM SALT, the name given in pharmacy to the hydrated sulphate of magnesia, which was obtained as far back as the year 1675, by evaporating the waters of some mineral springs at Epsom. Sea water was afterward found to contain it, the brine remaining after the separation of the common salt consisting of the sulphate of magnesia and the chlorides of magnesium and calcium. It was readily obtained by collecting the first crystals which formed, and washing them with a strong solution of the same salt. An excellent quality is manufactured at Baltimore and Philadelphia, from the mineral magnesite, a silicious hydrate of magnesia, which is found in the serpentine of that region. The mineral, reduced to powder, is dissolved in sulphuric acid. The product being dried is calcined in order to decompose the sulphate of iron, and convert it into the peroxide of iron. It is then dissolved in water, and any iron present is precipitated by sulphuret of lime. The crystals of sulphate of magnesia are separated and dissolved again to complete their purification. This salt, and calcined magnesia also, have been prepared from the dolomite or magnesian carbonate of lime, by the process of Mr. William Henry of Manchester. The mineral was calcined, and the lime and magnesia were then converted into hydrates by sprinkling with water; the former was dissolved out by a minimum quantity of hydrochloric acid, and the latter was converted into a sulphate by sulphuric acid.—Epsom salt is also found as a mineral substance, incrusting the walls of caves, in the form of an efflorescence, and also in silky fibres. In the Mammoth cave in Kentucky, loose masses of it are seen adhering to the roof like snow balls, and in many other caves of the western states it is found upon the walls or mixed with the earth upon the floor. It occurs in some of the gypsum quarries near Paris, and in other parts of France; and wherever water becomes charged with gypsum or sulphate of lime, and flows over rocks containing carbonate of magnesia, the sulphate of magnesia is likely to appear from the result of mutual decomposition of the two salts. Hydrated sulphate of magnesia consists of 1 equivalent of magnesia, 20; 1 of sulphuric acid, 40; and 7 of water, 63=123; or, per cent., magnesia 16.26, acid 35.52, and water 51.22. It crystallizes in 4-sided prisms with reversed dihedral summits, or 4-sided pyramids. Their hardness is 2.25, and specific gravity 1.75. The crystals effloresce slightly in the air, and if they contain any chloride of magnesinm this is shown in their deliquescing. They dissolve in their own weight of water at 60°, and in ¼ their weight of boiling water. Sulphate of soda is sometimes fraudulently mixed with Epsom salt. Its presence may be detected by dissolving 100 grains in water, and precipitating with a boiling solution of carbonate of potash. Unless this precipitate of carbonate of magnesia amount when dried to 34 grains, sulphate of soda is no doubt present. The salt is much used in medicine as a cathartic, and being of a mild and cooling nature, is particularly adapted to the treatment of fevers and inflammatory affections. The medium dose is an ounce, and this is said to be deprived of its bitter taste, and rendered quite palatable, by being dissolved in about a pint of water, and boiled a few minutes with 1½ grains of tannic acid or 2 or 3 drachms of roasted coffee, strained, and sweetened with sugar.

EQUATION (Lat. *æquo*, to make equal), an algebraic sentence affirming the equality of two quantities. Equations, however, are used not only in simple algebra, but in all the higher branches of calculus, according to the general principles explained in the article Algebra.—Equation of Payments is an arithmetical rule for finding the mean or average time for paying several sums due at separate times: thus, multiply each sum by the number of days, from one day before the first falls due until that sum is due; divide the sum of these products by the whole amount due, and the quotient will be the number of days to be counted from the day before the first falls due.—Equation of Time is the difference of time between a true sun dial and a true clock, as explained under Day.

EQUATOR (Lat. *æquo*, to make equal), a circle round the earth midway between the poles, so called because when the sun is vertical over this circle (March 20 and Sept. 20) the day and night are equal in all parts of the world. The celestial equator is a circle in the heavens, midway between the poles. When the sun crosses the celestial equator he is vertical at the equator.

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EQUATORIAL, belonging to the equator, a geographical and astronomical term. An equatorial signifies an equatorial telescope, that is, a telescope which revolves on an axis parallel to the axis of the earth, which renders its motion parallel to the plane of the equator. (See OBSERVATORY.)

EQUINOX (Lat. *æquus*, equal, and *nox*, night), the moment when the sun's centre crosses the celestial equator; the vernal equinox being about March 20, and the autumnal about Sept. 20.—EQUINOCTIAL LINE is a name sometimes given to the equator.—The EQUINOCTIAL POINTS are the points in the celestial equator at which the sun's path crosses the equator; these points move slowly westward, as explained in the article ECLIPTIC; the movement is called the precession of the equinoxes.—EQUINOCTIAL COLURE is a celestial meridian passing through the equinoctial points.

EQUITES (plural of the Lat. *eques*, horseman), or knights, an order of the people in ancient Rome, which in some respects may be compared with the English gentry. Their origin is attributed by Roman historians to the institution of Romulus, who is said to have selected the first 300 out of the 3 chief divisions of the patricians, and to have divided them into 3 centuries, named Ramnenses, Titienses, and Lucernes, corresponding to similar names of the 3 patrician tribes. Tarquin the Elder added 3 new patrician centuries, and Servius Tullius 12 new ones from among the richest plebeians. They formed a regular military body, being obliged to serve on horseback in time of war, and were divided into *turmæ* of 30 men each, subdivided into tens. They were also called *celeres*, and their chiefs *tribuni celerum*. Politically they seem to have represented an aristocracy of wealth in opposition to the aristocracy of birth, particularly after they became a distinct body of the people by the institutions of Servius Tullius. Under the republic the knights were enrolled by the censors and consuls for a service of 5 years, being supplied by the state with a large sum for the purchase, equipment, and maintenance of a horse, but with no personal pay. Every dictator, immediately after his appointment by the senate, had to select a commander of the horse, called *magister equitum*. During service they had no vote in the assemblies of the centuries. At the time of the siege of Veii, when the want of cavalry was much felt by the Romans, a new body was added to the ancient knighthood, consisting of a large number of young volunteers who offered to enter the ranks at their own expense. The new knights received a regular pay, but had no vote, and no share in many distinctions enjoyed by the old order. Gradually they coalesced into a numerous and wealthy middle class, placed politically and socially between the patricians and plebeians, and were so recognized by a law of Caius Gracchus (123 B. C.). Of the privileges as jurymen which the same laws bestowed upon them, they were deprived by Sylla. At that period they were generally the farmers of the public revenues, under the name of *publicani*. As such, though their merits are extolled by Cicero, who belonged to their order, they seem to have been despised by the Roman people. Under the empire, owing to the heterogeneous elements of which their increased body was composed, they gradually sank, and in spite of efforts to restore their influence, they disappeared from the stage of political life under the later emperors. In general the history of the Roman knighthood, as a political institution, is involved in great obscurity.

EQUITY. In a general sense, equity is natural right, but as used in jurisprudence it denotes an administration of law with reference to the particular circumstances of a case, in contradistinction to the ordinary method of adjudicating by a rule of general application. This, however, is a theoretical rather than a practical view, for equity as distinguished from strict law is necessarily administered by uniform rules. A judgment founded upon the particular circumstances of a case, without any reference to principles applying in common to such case and to others, would hardly deserve the name of a judicial decision, but rather would be an arbitrary opinion unregulated by legal analogy. In other words, it would be the capricious adjudication of a court not bound by any precedent. This has never been the nature of equity as administered in any country where laws have been prescribed for the regulation of society. At an early period, it is true, many cases would occur which were not provided for by legislation. In these a discretion must be exercised; but every case when decided becomes a precedent, and thus in time the equitable or exceptional law acquires a systematic form and obligation. Another class of cases is where a positive law is productive of some individual hardship not contemplated in the enacting of the law. Relief may then be afforded by the intervention of an equitable power, whose office is not to abrogate or interfere with the operation of the law according to its real intent, but to afford exemption in cases which were probably not foreseen, and therefore could not have been intended. Again, there may be an omission in a law, whether it be statutory or derived from custom, to provide for cases of non-compliance by reason of casualty or some cause not involving serious fault. Thus where forfeitures or penalties are consequent upon the failure of strict performance of an agreement, there is an obvious distinction between intentional neglect and accidental failure, especially if in the latter case it was by inevitable misfortune. There is here room for equitable relief in the one case without impairing the operation of the law in the other, to which alone it justly applies. It is indeed difficult to distinguish with exact precision the line that divides culpable negligence from excusable omission; or again, to determine how far actual disability should be a ground of relief from legal obligation. A man of small capacity for business may

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make improvident contracts which he cannot fulfil, or another who has ordinary sagacity may still by accident be deprived of the means of paying debts which he has fairly incurred. Where no fraud is involved, the obligation of contracts cannot as a general rule be abrogated by a court of equity. Hardship will sometimes occur, and there is a natural impulse to give relief in the individual case; but such leniency often repeated is found to be productive of counterbalancing consequences not at first anticipated, and the necessity of a general rule becomes apparent. The discretionary power of the Roman prætor was at first unrestricted. Soon, however, his discretion was brought under certain rules from which he was not allowed to depart. It is true that annually when each prætor went into office he made a formal publication of the rules by which he would be governed in his administration of the laws during his term of office, which might allow the inference that he had an arbitrary liberty to disregard former precedents; but practically it was but the adoption of the edict of his predecessors, with occasional modifications suggested by enlarging experience. The English equity system was early dissevered from the ordinary administration of law, and has ever since remained separate. Yet the equitable principles maintained in the court of chancery could have been applied by the common law courts, and to some extent the latter have been compelled to admit modifications into their practice by analogy to equitable proceedings. Thus the penalty of a bond was formerly held to be the debt, and to be recoverable; yet after the court of chancery gave relief upon the payment of the real debt, which was usually specified in the condition of the bond, the common law courts gave the same relief at any time before judgment; though if payment of the amount really due was not prior to that time tendered, judgment could be entered for the penalty and enforced by execution for the whole amount. A similar change has also taken place with regard to mortgages. (See EQUITY OF REDEMPTION.) Again, the conveyance of lands to uses became a peculiar subject of equity jurisdiction; the use not being recognized at law, but being enforced in chancery. The statute of uses (27 Henry VIII.) was intended to make the use cognizable as the real title in courts of common law, but this effect was defeated by the over-nice scruple of the judges, whereby a limitation of a second use, as if a conveyance was made to A for the use of B, in trust for C, was held not to be within the statute; and the court of chancery again intervened to enforce such second use under the name of a trust, and has ever since retained exclusive jurisdiction of that class of cases in England. Another peculiarity of the English equity system was formerly the right of calling upon the defendant in the action to testify, first by a sworn answer to the complaint, and then by examination upon accounting, and in various other cases, at the election of the complainant. But this distinction has been superseded by the recent statutory provisions in England and the United States, by which parties are made competent witnesses in all the courts. (See EVIDENCE, and also CHANCERY.)

EQUITY OF REDEMPTION, the interest which the owner of lands retains after having mortgaged them, or rather after the mortgage has become due. By the common law, upon the non-payment of the sum secured by the mortgage at the day when due, there was an absolute forfeiture of the mortgaged property; but courts of equity interfered and compelled the mortgagee upon tender to him of the amount really due to deliver up the premises, and he was also obliged to account for the profits if he had been in possession. At an early period a mortgage was considered to be a conveyance subject to be defeated by the payment of a specified sum at a certain time, the mortgagee being in the mean time entitled to the possession as the legal owner; and even since the change introduced by the courts of equity in respect to the right of the mortgageor to redeem, the old theory has still so far prevailed in England that the right of possession was deemed to pass with the mortgage. Although latterly the mortgageor has usually retained possession until the debt has become due, yet this is only by the assent of the mortgagee; and unless a stipulation to that effect is contained in the mortgage, there is nothing to prevent the mortgagee from maintaining an action of ejectment to obtain possession. Yet notwithstanding this apparent legal ownership, the equitable doctrine is that the mortgageor is the real owner until foreclosure, so far at least that his estate descends to his heirs, or may be devised or otherwise conveyed by him, subject only to the right of the mortgagee, which right is to hold the land as a security for payment of the debt. An incongruity is however still suffered to exist in several particulars. Thus a lease made by the mortgageor can be avoided by the mortgagee, while on the other hand a lease by the mortgagee is subject to the limitation of his estate, and on payment of the mortgage will cease. So the wife of the mortgageor was held not entitled to dower because he had only an equity of redemption, yet the wife of the mortgagee was also excluded on the ground that the estate which he had was in the nature of a trust. But now, by the statute 3 and 4 William IV., c. 105, the equity of redemption is subject to dower and curtesy. In the United States the equity doctrine has been long since carried out with more consistency. The mortgage is considered merely as a security, which can be made available only by a sale under a decree of a court or under a power of sale contained in the mortgage itself. Until such sale the fee of the estate is in the mortgageor, and he has the entire disposition of it, except that the lien of the mortgage will continue as against all persons to whom the lands may descend or be conveyed; the mortgageor retains possession until such sale, unless his right is divested by a court of equity, by reason of the insufficiency

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of the mortgaged lands as a security. So the estate of the mortgageor is subject to the lien of a judgment, and may be sold on execution, and his wife is entitled to dower except as against the mortgagee, and even as against him unless she joined in the mortgage. This is on the supposition that the mortgage was made subsequent to marriage; if made before, the dower of the wife would of course be subject to the right of the mortgagee. Such in the state of New York are the incidents of the estate of the mortgageor, usually though not with strict propriety termed the equity of redemption; the same system has been generally adopted in the other states.

EQUIVALENT, Chemical. It is a matter of experience, that when an element enters into chemical combination with another element, it does so in a fixed proportion which may be expressed in numbers. This ratio is termed the combining equivalent, combining proportion, equivalent weight, or simply the equivalent of the element. The term atomic weight is also used synonymously by those who accept the atomic theory. Each of the elements has its own special combining equivalent, and is incapable of uniting with other elements except in this proportion or some multiple of it. The equivalents of compound bodies are represented by the sums of the equivalent numbers of all the elements which enter into their composition. The weights of the equivalents of the elements are ascertained by determiuing experimentally how much of each is required to replace the others in their combinations with some well-known element, the weight of the equivalent of which has been assumed. Thus, the quantity by weight of each element which unites with one equivalent of oxygen to form a protoxide, analogous to water, is usually considered to represent its equivalent. A knowledge of the exact weights of the equivalents is of the first importance to chemists; all calculations regarding the composition of bodies, as in analysis, or of the quantities of materials to be employed in the manufacture of compounds, being based upon them. As the equivalent numbers express nothing but the relative weights in which the elements unite with each other, it is evident that the weight of any one equivalent may be arbitrarily chosen as a standard to which all the others shall be referred; it is essential only that the relation be strictly observed. Tables of equivalents are thus constructed, in which the equivalent weight of each of the elements is attached to its name. Several standards have been selected by different chemists; only two, however, have ever been generally used. The equivalent weight of hydrogen, being smaller than that of any other element, was regarded as unity by Dalton, who referred all the other equivalents to it. This system has always been generally adopted by the chemists of Great Britain and the United States. It possesses the very great advantage that in it the equivalents are represented by small numbers, many of them without fractions, which are convenient in calculations, and can be easily retained by the memory. Another table, in which the equivalent weight of oxygen is assumed to be 100, has been much used on the continent of Europe. It was proposed by Berzelius, mainly it would seem for the purpose of discountenancing a theory advanced by Prout, that all the equivalent numbers are simple multiples of that of hydrogen; superiority was claimed for it on the ground that as oxygen is the most abundant of all the elements, and since the greater number of bodies studied by chemists are compounds of it, calculations would be simplified if its equivalents were regarded as equal to 100; in which case it is only necessary to add 100, 200, 300, &c., to the equivalent weight of the element with which oxygen is combined, in order to ascertain the equivalent weights of its several oxides. The equivalent of sulphur, a very common element, would also have a simple expression, being equal to 200. These instances, however, do not at all compensate for the high numbers by which the other equivalents must be represented; numbers which cannot be remembered without great difficulty, and which render even the most common calculations extremely laborious unless logarithms are resorted to. Berzelius, who believed that the equivalent numbers should be regarded as entirely accidental and unconnected with each other, desiring to give them the most accurate possible expression, introduced the custom of attaching to them large decimal fractions; indeed, the power to do this which is afforded by the high numbers of his system has always been claimed as one of its advantages. The accuracy of thus employing several decimals, in cases where the process by which the result has been obtained is liable to errors of considerable magnitude, was long since pointed out by Erdmann, who has called attention to the fact that no greater or lesser number of decimals ought to be given than the experiment justifies. All tables of equivalents heretofore published are more or less defective from neglect of this truth. The equivalent numbers have been recently thoroughly investigated and revised by Dumas, who has again brought forward and upheld Prout's theory, which, owing to the vigorous opposition of Berzelius, had found but few supporters of late years. Most of the equivalents thus far studied by Dumas are simple multiples of that of hydrogen. To this rule there are, however, several exceptions; among which some are multiples of $\frac{1}{2}$, while others are multiples of $\frac{1}{4}$ of an equivalent of hydrogen. It may be mentioned that it is still a matter of doubt whether the equivalents of several of the elements should not be regarded as twice, or that of others as $\frac{1}{2}$ of those ordinarily admitted; a change which would greatly simplify certain portions of chemical science. This question has been warmly discussed for several years, and many chemists habitually employ equivalents thus modified; in this article, however, the most common

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usage of chemists will be adhered to. The numbers in the annexed table of equivalents have been taken in part from Dumas' memoir, (*Comptes rendus*, xlvi., 952), and in part from Kapp and Will's *Jahresbericht für Chemie*, &c., *for* 1857. For convenience of reference both the hydrogen and oxygen scales are given; the numbers of the latter being readily obtained by dividing those of the former by the fraction $\frac{12.5}{100}$. The names of those elements which from their variety are comparatively unimportant, are printed in italics; the equivalents of a few of these have not as yet been determined.

Names of the Elements.	Symbols.	Equivalents. H=1	Equivalents. O=100
Aluminum.	Al.	18.75	171.875
Antimony (*Stibium*).	Sb.	122.00	1293.00
Arsenic.	As.	75.00	937.50
Barium.	Ba.	68.50	856.25
Bismuth.	Bi.	214.00	2675.00
Boron.	B.	10.90	136.25
Bromine.	Br.	80.00	1000.00
Cadmium.	Cd.	56.00	700.00
Calcium.	Ca.	20.00	250.00
Carbon.	C.	6.00	75.00
Cerium.	Ce.	47.00	587.50
Chlorine.	Cl.	35.50	443.75
Chromium.	Cr.	26.70	333.75
Cobalt.	Co.	29.50	368.75
Columbium (Tantalum).	Ta.	68.80	860.00
Copper (Cuprum).	Cu.	31.70	396.25
Didymium.	D.	48.00	600.00
Erbium.	E.	.....	.....
Fluorine.	Fl.	19.00	237.50
Glucinum.	G.	4.70	58.75
Gold (Aurum).	Au.	197.00	2462.50
Hydrogen.	H.	1.00	12.50
Iodine.	I.	127.00	1587.50
Iridium.	Ir.	99.00	1237.50
Iron (Ferrum).	Fe.	28.00	350.00
Lanthanum.	La.	47.00	587.50
Lead (Plumbum).	Pb.	103.50	1293.75
Lithium.	Li.	7.00	87.50
Magnesium.	Mg.	12.50	156.25
Manganese.	Mn.	27.50	343.75
Mercury(Hydrargyrum).	Hg.	100.00	1250.00
Molybdenum.	Mo.	48.00	600.00
Nickel.	Ni.	29.50	368.75
Niobium.	Nb.	.....	.....
Nitrogen.	N.	14.00	175.00
Norium.	No.	.....	.....
Osmium.	Os.	99.60	1245.00
Oxygen.	O.	8.00	100.00
Palladium.	Pd.	53.30	666.25
Phosphorus.	P.	31.00	387.50
Platinum.	Pt.	98.70	1233.75
Potassium (Kalium).	K.	39.30	490.00
Rhodium.	Rh.	52.20	652.50
Ruthenium.	Ru.	52.20	652.50
Selenium.	Se.	40.00	500.00
Silicon.	Si.	21.00	262.50
Silver (Argentum).	Ag.	108.00	1350.00
Sodium (Natrium).	Na.	23.00	287.50
Strontium.	Sr.	43.75	546.875
Sulphur.	S.	16.00	200.00
Telburium.	Te.	64.00	800.00
Terbium.	Tb.	.....	.....
Thorium.	Th.	59.60	745.00
Tin (Stannum).	Sn.	59.00	737.50
Titanium.	Ti.	25.00	312.50
Tungsten (Wolfram).	W.	92.00	1150.00
Uranium.	U.	60.00	750.00
Vanadium.	V.	68.60	857.50
Yttrium.	Y.	.....	.....
Zinc.	Zn.	32.75	409.375
Zirconium.	Zr.	22.40	280.00

ÉRARD, SÉBASTIEN, a French manufacturer of musical instruments, born in Strasbourg, April 5, 1752, died in Passy near Paris, Aug. 5, 1831. His father, a cabinet maker, dying in needy circumstances, he went to Paris at the age of 16, and apprenticed himself to a maker of harpsichords. Possessing a remarkable inventive faculty, he soon rose to the position of foreman, and his ingenuity bade fair to be of great benefit to his employer, when the latter, moved by jealousy, dismissed him from his service. Another harpsichord maker who had received an order for an instrument, the construction of which baffled his ingenuity, offered him a certain sum to undertake the work, provided only the employer's name should appear in connection with it. The instrument, when completed, excited so much admiration, that the maker was compelled to confess that it was the production of Érard. Attention was at once drawn to the young workman, who was applied to for a variety of new instruments which people wished to have constructed, and who soon after much increased his reputation by the production of a *clavécin mécanique*, or mechanical harpsichord, which contained several improvements on the instruments in use. The duchess de Villeroy, a woman of taste in music, wished to retain him in her service; but preferring his liberty, he declined her flattering offers, and remained in her hotel, where a suitable work room had been fitted up for him, only long enough to execute several ideas which she suggested. It was here, in 1780, that he constructed his first pianoforte, an instrument which, though invented a number of years previous, was then almost unknown in France, and the introduction of which into that country may be said to date from this time. In connection with his brother Jean Baptiste, he soon after established a manufactory of pianofortes in Paris, which gradually became the first in Europe. Among his inventions was an instrument with 2 key boards, one for the piano, and one for the organ; one of which was fitted with a sliding key board for transposing the music, for the use of Marie Antoinette. During the revolutionary period, the brothers Érard went to England, and established a manufactory of pianos and harps in Loudon; but in 1796 Sébastien returned to Paris, and thenceforth his life was passed between that city and Loudon. He constructed the first grand pianos with single action ever made in Paris; subsequently in 1808 much improved the mechanism of the instrument, and in 1823 completed his inventions in this department, by the production of his grand piano with repeating movement. In 1811 his double action harp appeared in London, where it became so popular, that in a single year, instruments to the value of £25,000 were sold. His last important work was the grand organ constructed between 1827 and 1830 for the chapel royal of the Tuileries. During the last 40 years of his life his inventive faculty seemed never idle, and of the 15 or 20 inventions for which he took out patents, not one was perfected without close study and repeated experiments. The celebrity which his instruments have gained remains undiminished, and Érard pianos are still unsurpassed for

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roundness, fulness, and beauty of tone.—He was succeeded in the firm by his nephew JEAN BAPTISTE ORPHÉE PIERRE, born in Paris in 1794, died at the chateau La Mucette, Aug. 3, 1855. He possessed much of the inventive skill of his uncle; published in 1849, *Notice sur les pianos d'Erard en Espagne, en Italie, en Suisse, en Russie*, &c., and rebuilt in 1850 the organ constructed by Sébastien Érard in the Tuileries, which had been destroyed during the revolution of 1830. His death is said to have been caused by grief at the injury done to his estate at Passy by the construction of a railroad. His last work, a piano estimated at $5,000, was presented by his widow to the lottery opened in behalf of the sufferers by the Crimean war.

ERASMUS, DESIDERIUS, a Dutch theological and classical scholar and writer, born in Rotterdam, Oct. 28, 1467, died in Basel, July 12, 1536. He was the natural son of Gerard Praët and Margaret, the daughter of a physician of Sevenbergen. He himself received the name of Gerard, but afterward assumed its Latin synonyme Desiderius, the Greek translation of which furnished his surname. He was sent first to the school of Gouda, and afterward to the cathedral at Utrecht to become one of the choir boys. At the age of 9 he was transferred to the monastic school at Deventer, where he applied himself with great diligence to the study of the classics. In 1480 both his parents died, and his monastic tutors sent him to the school of Romboldus at Bois-le-Duc, that he might fit himself for the priestly state. For some years he resisted their wishes, and neglected the studies which they arranged for him; but in 1486, after he had been prostrated by a prolonged fever, he was persuaded by a friend who had just come back from Italy to embrace a life so free from excitement and so favorable to study, and entered as a novice into the convent of Stein near Gouda, of which, a year later, he became a regular brother. The discipline of the convent at Stein was not strict, and the distaste which Erasmus showed for ascetic practices was not reckoned as a sin. He was allowed to study in other than theological treatises, and his reputation as a classical scholar was soon widely spread. In 1492 he was selected as a companion by the bishop of Cambray, and was ordained to the priesthood. Erasmus remained with his patron at Cambray 5 years, when he went to study at the college of Montaigu in Paris, where he supported himself with difficulty by taking pupils. His studies were interrupted by serious sickness, which left in him the seeds of a constitutional malady from which he suffered all the rest of his life. On his return from a visit to relatives in Holland, he established himself in Paris as a teacher of classical literature. Among the numerous and distinguished pupils whom his reputation attracted, the one who was able most to befriend him was a young English nobleman, William Blount, Lord Montjoy. By this friend he was promised an annual pension of a hundred crowns if he would take up his residence in England. His two years' stay in that country was made pleasant by the attentions of the nobility, and the friendship of the most eminent English scholars. He was presented at court, studied at Cambridge and Oxford, became the associate of More and Colet, and added to his previous acquirements a thorough knowledge of Greek. For several years after his return from England he led an unsettled life, teaching in various cities of France and Holland, translating the ancient classics, investigating the text of the Scriptures, and continually increasing his acquaintance with the scholars of Europe. In 1505 he again visited England, received from Cambridge the degree of bachelor in theology, and was presented to Archbishop Warham. The presents received during this visit made it possible for him to realize his long-cherished wish to visit Italy. His stay there lasted nearly 3 years, and was divided between the cities of Turin, Bologna, Padua, Venice, Florence, and Rome. At Turin the degree of doctor of theology was conferred upon him. In Venice he resided with the famous printer Aldus Manutius, while his collection of "Adages" was in press. In Rome he was treated with great regard by the pope. In 1509, on the accession of Henry VIII., he was induced to go back to England. On the journey thither he composed his *Moriæ Encomium*, the "Praise of Folly," in many respects his most remarkable work. On his arrival he was received by his friend More, was presented with a living by the archbishop of Canterbury, which he resigned for a pension of £20, and accepted professorships of theology and of Greek at Cambridge. In 1514 he returned to the continent at the invitation of the archduke Charles, afterward Charles V., from whom he received the appointment of royal councillor, with a small salary; a sinecure which allowed him to reside where he chose, and in which he employed his time almost wholly with literary pursuits, correspondence, theological, polemical, and satirical writing, and with editions and translations of many of the less known Greek and Roman classics. With Reuchlin, his only rival as a linguist, he carried on a spirited controversy concerning Greek pronunciation; and the theory which he maintained has, until the present century, been generally received in the schools of Europe. With Luther his dispute was still more sharp. The monk of Wittenberg was at first a warm friend and admirer of the great scholar; but finding that the liberal spirit of Erasmus was not ready to adopt the extreme tenets of the reformers, he at first expostulated with, then ridiculed, and then denounced his former friend as a time-server, a coward, and a foe to true religion. Erasmus was equally unfriendly to the monastic habits and to the subtleties of the scholastic divinity, and exercised his wit on both of these; but he had no love for theological quarrels, and no wish to draw upon himself unpopularity or persecution. He welcomed the reformation as a movement of free thought, but deprecated its excesses. He disliked all dogmatism, as well as

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all extravagance in religious rhetoric, and would have the reformers confine themselves to the patent vices of the monks and clergy, leaving aside the possible errors in doctrine. His middle course in regard to the reformation brought upon him the censure of zealots in both parties. In 1521 he had taken up his residence in Basel, where he was presently called on to mediate between the Catholic magistrates and the rising Protestant party. He could only add fuel to the flame by his moderate counsels. The insurrection of Feb. 1529 completed the overthrow of the authorities; the Roman Catholic religion was definitely prohibited in the city, and all who had opposed the new doctrine were compelled to depart. Though Erasmus had already been condemned as a heretic by the college of the Sorbonne, he could not endure the society of the men who were now in power. He changed the place of his residence to Freyburg, where he remained from 1529 to 1535. In vain did the Catholic party try to win him back to full communion, and in vain did the reformers attack him by jest and sarcasm. He answered the libels of Geldenhauer by pungent rejoinders, he evaded the summons to the diet at Augsburg, and his "Retractations," though promised, were never published. He declined more than one tempting offer, and while he was not unwilling to accept additions to his scanty income, did not care to obscure his literary fame by the more imposing dignity of a place in the sacred college. In 1535 he returned to Basel, where an attack of gout compelled him to remain, and where he died in the arms of his friends. His last days were cheered by the friendly visits and messages of distinguished men both of the Protestant and of the Catholic party. In the midst of severe suffering, he was able to retain his calmness, and to pursue his wonted labors. His death was lamented as a public calamity; a long procession of magistrates and students followed his funeral; and the bequest of his whole property to the aged, the poor, and the orphan, seemed to justify the monument which was erected to him in the cathedral at Basel, and which still remains the chief object of interest in that edifice. Erasmus was small in stature, with light hair and light blue eyes. His portrait by Holbein represents his look as sickly and his face as thin and wrinkled. He was fond of luxurious living, but unable from physical weakness to gratify his appetites. His timidity was excessive. He dreaded to stay in the neighborhood of any contagious disease, and, in spite of his rationalistic tendencies, was frequently haunted by superstitious fears. He had a fine native humor, a keen enjoyment of witty discourse, and an accurate eye for every form of beauty. His taste was as refined as his knowledge was prodigious. He was versed in all the studies of his age; in most of them he excelled. His reading was various, but not desultory. His treatises were finished productions, and their style is always clear, flowing, and eloquent. Erasmus aided the reformation rather as a scholar and critic than as a thinker or reasoner. He exposed the abuses of the convents and the inconsistencies of the scholastic theology, but he produced no new creed and argued in favor of no heretical doctrine. His defence of the right of reason against authority was weak and evasive. But he revived the study of the Scriptures in their original tongue, affirmed the superior value of early Christian testimonies, and gave an impulse to biblical and patristic investigations. He was, it may be said, the most gifted and industrious pioneer of modern scholarship.—Erasmus published in 1516 the first edition of the Greek Testament from manuscripts, which has been regarded as his greatest work. His complete works, with a biography, were published after his death by Beatus Rhenanus (9 vols. fol., Basel, 1540–'41). Another more complete edition was published at Leyden by Le Clerc (10 vols. fol., 1703–'6). Of the "Colloquies," his most famous work, a great number of editions have been published; the best is that of Amsterdam (1650). The *Moriæ Encomium* also passed through a great number of editions; it was translated into German and illustrated by Holbein; the latest edition is that of Havre (1839). The other most important works of Erasmus are the *Copia Verborum;* the *Adagiorum Collectanea;* the treatise *De Libero Arbitrio*, which was answered by Luther; the *Paraclesis*, an exhortation to the study of Christian philosophy; the volume of *Epigrammata;* the *Antibarbarorum Liber; Lingua*, a satirical work; an explanation of the "Apostles' Creed;" *Ecclesiastæ, sive de Ratione Concionandi*, in 4 books; and the immense collection of "Epistles," which, perhaps more than any other of his works, show the character of the man. Of his purely classical works, there are editions of Seneca, Suetonius, Aurelius Victor, Ammianus Marcellinus, Eutropius, Quintus Curtius, Cicero *De Officiis*, the "Tusculan Questions," Pliny the Elder, Livy, and Terence, who was his favorite among the Latins, as Plutarch and Lucian were among the Greeks. He also published translations from Xenophon, Isocrates, Euripides, and Libanius, and issued editions of Ptolemy, Demosthenes, and Aristotle. Among his works are also many controversial apologies, scriptural expositions, and liturgical treatises.—The life of Erasmus has been written by Beatus Rhenanus, Melchior Adam, Merula, Scriverius, and Gaye, in Latin; by Henke and Müller in German; by Lévesque de Busigny, Bayle, Bullart, and Nisard, in French; and by Jortin, Knight, and Charles Butler, in English.

ERASTUS (Liebeb), Thomas, a Swiss physician and theological polemic, born in Baden, Sept. 7, 1524, died in Basel, Dec. 31, 1583. He studied theology and literature in Basel, where he narrowly escaped death by the plague in 1544. He next studied medicine in Bologna, practised this profession with remarkable success, and after being for many years professor of physic at Heidelberg, obtained in 1580 the chair of ethics at Basel. A skilful practitioner,

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relying on induction from experience rather than on dogmas and theories, he was a formidable opponent of the reveries of Paracelsus and his disciples. His principal theological controversy was with Dathenus and Beza concerning the doctrine of excommunication. He held that ecclesiastical censures should extend only to divergences in theological opinion, and not at all to vices and immorality, which were civil offences, and properly punishable only by temporal magistrates. In some of his writings he seems to favor the principle that all ecclesiastical authority is subordinate to the civil power, which is the doctrine commonly recognized as Erastianism.

ERATH, a central co. of Texas, comprising part of a fertile and well watered district near the sources of Brazos river; pop. in 1858, 766, of whom 42 were slaves. The surface is generally undulating, but there are some eminences on the S. and N. E. borders. The soil in the valleys is excellent; the uplands are less fertile, but afford good pasturage. Timber of various kinds covers about ¼ of the surface. Stephensville is the capital. The county was formed from Bosque and Coryell in 1856.

ERATO, one of the nine muses, daughters of Jupiter and Mnemosyne. In the theogony of Hesiod she holds the 6th place among them. Her name was derived from the Greek word for love, and she was the protectress of nuptial ceremonies, and the muse of erotic poetry. She disputed with Mercury the honor of having invented the lyre.

ERATOSTHENES, a Greek astronomer, geometer, geographer, poet, and philosopher, born in Cyrene in 276 B. C., died about 196. He possessed a remarkable extent of learning and versatility of talent, and was variously named by his contemporaries the "cosmographer," the "mensurer of the universe," the "second Plato," and the "pentathlete" or victor in 5 contests, his erudition in each department being thus represented under the figure of a victory obtained over ignorance. He had for masters Ariston the philosopher, Lysanias the grammarian, and Callimachus the poet, and he completed his education in Athens. His fame reached Ptolemy III., king of Egypt, who invited him to Alexandria and intrusted to his care the renowned library of that city. He is said to have died of voluntary starvation, to which he was led by regret for having lost his sight. His most important work, the Γεωγραφικα, treated of the nature and form of the earth, which he supposed to be a motionless globe, of its magnitude, and of the countries, towns, lakes, rivers, and mountains which mark its surface. He was the founder of geodesy, and was the first to compute the magnitude of the earth by the astronomical method still in use. (See EARTH.) He suggested the construction of the large *armillæ*, or fixed circular instruments, which were long in use in Alexandria, devised a method for discovering the prime numbers, and resolved the problem of the duplication of the cube. Among his works was one of universal chronology, the fragments of which form the basis of the system adopted by Bunsen in his work on Egypt. He also wrote verses on numerous scientific subjects, a commentary on the astronomical poem of Aratus, and treatises on comedy and on the Homeric poems. A number of other works are attributed to him upon doubtful grounds. None of his writings, excepting a few brief fragments, remain; but Strabo and other later writers made great use of his geographical works.

ERCILLA Y ZUÑIGA, ALONSO DE, a Spanish poet, born in Madrid, Aug. 7, 1533, died about 1595. He was a scion of an ancient Biscayan family, and after the death of his father, Fortunio Garcia, who was a member of the council of Charles V., he resided with his mother, whose family name (Zuñiga) he adopted, at the imperial court, where he was educated as one of the pages of the future Philip II. He accompanied him on his travels abroad, and was in England in 1554 when Philip married Queen Mary. About this time the Araucanians in Chili, whose territory had been invaded by the Spaniards in 1537, rose against them, and many Spanish knights then at the British court volunteered to serve in the war. Ercilla joined this expedition, in which he distinguished himself as much by his prowess on the battle field as by the heroic spirit with which he bore the difficulties attending the wanderings in the wilderness and the painful warfare with its savage inhabitants. In an interval of the war, he had the misfortune to be involved in a duel during a public tournament which was held in honor of the accession of Philip II. to the throne. Ercilla and his antagonist were both ordered to be put to death, and it was not without difficulty that Ercilla's sentence was commuted to imprisonment. This occurrence, however, served rather to increase than to diminish his love of adventures, and he had no sooner recovered his liberty than he set out on another dangerous expedition against the sanguinary Lope de Aguirre. In 1562 he returned to Spain, and shortly afterward resumed the life of a wanderer, travelling several years on the continent of Europe. In 1570 he came back to Spain and married Maria de Bazan, an accomplished lady of the house of Santa Cruz. In 1571 he was made knight of Santiago, was employed on different missions by Philip II., and served for some time as a gentleman of the bedchamber of Rudolph II., the emperor of Germany. Little is known of the history of his latter years. His literary fame rests upon *La Araucana*, the most celebrated of Spanish epics. It is in 37 cantos, and celebrates the war with the Araucanians, in which the poet himself was engaged. It is remarkable for the accuracy of its historical, geographical, and statistical information, and in the glowing picturesqueness of its descriptions it is unrivalled in Spanish poetry. Cervantes in his "Don Quixote" goes even so far as to declare

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it equal to the great epics of Italy. Voltaire in the introduction to his *Henriade* also expresses great admiration of the poem, which, however, he does not seem to have read. Ercilla wrote the first and best part of this poem on the battle field, but did not live to complete it. The first 15 cantos were published in Madrid in 1569, the second part of the poem in 1578, and the third part in 1590. A continuation of the poem in 33 cantos, written by Osorio, appeared in 1597, and has been sometimes printed in connection with the work of Ercilla, to which it is much inferior. The best editions of *La Araucana* are those published at Madrid in 1776 and 1828.

ERDL, Michael Pius, a German savant, born May 5, 1815, died Feb. 25, 1848, officiated as professor of comparative anatomy and physiology at the university of Munich, and left a variety of writings in connection with those sciences. In 1836 and 1837 he accompanied Schubert on his travels to the East, and discovered that the surface of the Dead sea was situated far below the level of the Mediterranean.

ERDMANN, Otto Linné, a German chemist, born in Dresden, April 11, 1804, and since 1830 professor of chemistry at the university of Leipsic. In 1842 he established a chemical laboratory at Dresden, which is one of the best in Germany. He devoted much time to the chemical analysis of indigo and other dyestuffs, and his writings embodying the result of his investigations are not only useful to men of science, but also to merchants. A 4th edition of his *Lehrbuch der Chemie*, and a 2d edition of his *Grundriss der Waarenkunde*, appeared at Leipsic in 1852. Beside his other writings, which are contained in the periodical scientific press of Germany, he prepared the 5th edition of Schedel's *Waarenlexikon*, and published in 1827 an interesting treatise on nickel.

EREBUS, one of the oldest gods of the Greeks and Romans, son of Chaos and Night. He was changed into a river, into which he had been precipitated for having assisted the Titans. The term Erebus was frequently applied to a portion of the pagan inferno, a dark and gloomy space beneath the earth, through which the souls of the just passed on their way to enjoy the eternal and delightful life of Elysium.

ERECHTHEUS, or Erichthonius, the name of a fabulous hero of Attica, or according to some later writers, of two persons, of whom the younger was the grandson of the elder Homer describes Erechtheus as an autochthon and king of Athens, and the son of Gæa (Earth); he was educated by Minerva. The one whom Apollodorus mentions under this name was the son of Vulcan and Atthis. Minerva, who reared him secretly, gave him in a chest to Pandrosos and her sisters, who, opening it from curiosity, saw in it a serpent, were seized with madness, and threw themselves down the Acropolis or into the sea. Having expelled Amphictyon, he became king of Attica, established the festival of the Panathenæa, and founded on the Acropolis the temple which after him was called the Erechtheum. By his wife Pasithea he had a son whom he named Pandion. He is also said to have decided the dispute between Minerva and Neptune for the possession of Attica, in favor of the goddess, and to have introduced the use of chariots with 4 horses, for which he was set among the stars as Auriga. The myths connected with the life of the second Erechtheus are the Eleusinian war, the sacrifice of one of his daughters, and the suicide of the three others, in consequence of a response of the oracle, and his being killed by Jupiter with a flash of lightning, at the request of Neptune. The Erechtheus of Diodorus came from Egypt with grain in time of famine, was made king, and established the Eleusinian festivals. Another Erechtheus, the son of Dardanus and father of Tros in Ilium, is fabled as the richest of mortals, in whose fields grazed 3,000 beautiful mares.

EREGLI, or Ereklı (anc. *Heraclea*), a seaport town of Asiatic Turkey, on the Black sea, pop. 5,000. It has a good harbor, and exports timber, silk, and wax, in exchange for colonial produce, tobacco, and iron. Ship-building is carried on to some extent. A few traces are found here of the ancient Heraclea, which was a town of considerable importance, and noted as one of the stations of the 10,000 Greeks under Xenophon. Near this town is a coal field extending for about 80 m. along the shore of the Black sea. The coal mines are worked under the direction of 2 English engineers, yielding about 50,000 tons annually. There are 2 other towns of the same name, one situated in the district of Konieh, in Asiatic, and the other in the district of Gallipolis, in European Turkey. The latter has a harbor, and is the see of a Greek bishop.

EREMACAUSIS (Gr. *ηρεμα*, by degrees, and *καυσις*, a burning), the name given by Liebig to the slow combustion or oxidation which takes place in organic substances when exposed to the influence of the air, and which results either in the formation of the pulverulent brown substance called humus, as in the decay of woody fibre, or in some more highly oxidated compounds, as when alcohol is converted into acetic acid. It is the first change in the processes of fermentation and putrefaction, and is prevented by any causes that arrest these. The oxygen of the air first acts upon the hydrogen contained in the organic substances, the carbon usually exhibiting no tendency to unite with it until the substance has been raised to a high temperature. Moisture in the air expedites the process, and in some instances exposure to the action of alkaline bodies, and in others contact with other decaying substances, is necessary to induce it.

ERETRIA, an ancient city of the island of Eubœa, situated a little south of Chalcis, whose rival it was in commerce. It was founded prior to the Trojan war, and at an early period be-

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came rich, powerful, and one of the chief maritime states of Greece. It was early engaged in disputes with the Chalcians, and for having given assistance to the Ionic cities of Asia in their revolt from Persia it was razed to the ground by the Persians in 490 B. C. It was soon rebuilt S. of the old site, and took part in the Peloponnesian war. The philosopher Menedemus, a disciple of Plato, here established a celebrated school of philosophy. The ruins of this city are still visible.

ERFURT, a circle of the Prussian province of Saxony, bounded N. by Hanover and Brunswick, E. by Merseburg and Saxe-Weimar, S. by Saxe-Gotha, Saxe-Meiningen, and Saxe-Weimar, and W. by Hesse-Cassel; area, 1,306 sq. m.; pop. 346,000. About half the land is arable, and the chief products are corn, tobacco, hops, seeds, and salt. Great numbers of cattle are also raised, and mines of copper, lead, and iron are worked in the circles of Weissensee and Schleusingen. Manufactories of iron, cotton, and woollen fabrics, and many miscellaneous articles, are numerous.—ERFURT, the capital of the above province, and of Thuringia, is situated on the Gera, about midway between Gotha and Weimar; pop. 33,800. It was formerly a city of considerable importance, having at the end of the 16th century had nearly 60,000 inhabitants. It is a fortress of the 2d class, and derives great strategetical importance from its situation on the military high road of central Europe. The fort of Petersberg within the walls, and the citadel of Cyriaksburg without, contribute to its strength. Erfurt contains 14 places for Protestant worship, several Roman Catholic churches, and a synagogue. The cathedral, originally a fine Gothic structure, has suffered much from war, but has been repaired by the kings of Prussia within the present century. It contains one of the most massive bells of Germany, called *Maria Gloriosa*, and in popular parlance *Susanna*, this having been the name of the bell melted during the fire in 1251. Of the many convents which existed here till very recently, one only remains, the Ursuline nunnery, with a school conducted by the nuns. The finest modern churches are the *Barfüsserkirche* and the *Augustinerkirche*. The most interesting religious building of Erfurt is the Augustinian convent, in which Luther lived for several years. The convent is now used by the *Martinsstift* as an asylum for orphans and for other charitable purposes. Luther's cell is well preserved, and contains his portrait, Bible, and other relics. The university, opened in 1392, and once the 4th in Germany, was closed in 1816. The royal academy of popular sciences is remarkable for its extensive library. The congress of Erfurt (Sept. 27 to Oct. 14, 1808) was attended by Napoleon, Alexander of Russia, and many German sovereigns. In 1813 the town was taken by the Prussians, after a bombardment which destroyed 188 houses. From Nov. 24, 1848, to Aug. 4, 1849, the town was placed in a state of siege; and in March and April, 1850, the *Unionsparlament*, or Erfurt parliament, was held there in the church of St. Augustine.

ERGOT (Fr. *ergot*, cock's spur), a protuberance which grows out in a curved form resembling a cock's spur from among the grains of the plants of the *graminaceæ*, or grass tribe, as wheat, barley, and especially rye. As it is most commonly met with in the last, the substance has been known by the name of spurred rye (*secale cornutum*). Its origin has been ascribed to various causes. Some have thought it to be the seed altered by a diseased growth, caused by the attack of an insect, or by unfavorable circumstances of moisture, heat, &c. De Candolle thought it a fungus occupying the place of the seed, and called it *sclerotium clavus*. But the evidences are now generally regarded as conclusive of its being the grain itself, diseased and deformed by the influence of a parasitic fungus, attached to it from its earliest development. This fungus, distinguishable by the microscope, has been detected in other parts of the plant; and the white dust or *sporidia* on the surface of the ergot will engender the disease in other plants if scattered in the soil at their roots or applied to the grains.—Ergot as collected for medicinal purposes is in solid grains from ½ to 1½ inches long, of cellular structure, the cells containing oily particles. Its aqueous infusion is claret-colored, has an acid reaction, and possesses the peculiar properties of the substance. It was early used in medicine to expedite parturition by promoting the contraction of the uterus. It possesses poisonous qualities, and when the grain contaminated with it has been employed in making bread, as has sometimes occurred in France, terrible epidemics have followed its use.

ERIC IX. (according to some historians VIII.), king of Sweden, called after his death St. Eric, the son of "a good and wealthy yeoman" (in the words of an old Swedish chronicle) named Jedward, died May 18, 1160. His mother was Cecilia, sister of a former king. His wife was Christina, also of royal blood. He was elected to the throne of the Upper Swedes, or as it was called the "royal chair of Upsal," in 1150; and was the first sovereign in Sweden who saw Christianity firmly established in Upper Sweden. With a view to the spread of Christianity he undertook a crusade against the heathens of Finland; and by transplanting Swedish colonists thither, laid the foundation of the conquest of that country. On his return to Upsal, he was attacked by a Danish prince, Magnus Henrikson, and in the battle that followed, at East Aras (modern Upsal), he fell covered with wounds. His virtues and the austerity of his life procured him the reputation of a saint; but he was never canonized. His rule, which at first extended only over Sweden proper (or Upper Sweden), subsequently embraced Gothland (Lower Sweden). The effigy of St. Eric is preserved upon the arms of the city of Stockholm; and his remains, long the objects of veneration, are in the cathedral of Upsal.

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ERIC XIV., king of Sweden, the son and successor of Gustavus Vasa, born Dec. 13, 1533, died Feb. 26, 1577. In youth he was distinguished for his handsome person, his intelligence, and numerous accomplishments; but his passionate and suspicious disposition and immoderate indulgence in pleasure, early awakened the apprehensions of his father. Toward his brothers, who had been created dukes by the king jointly with himself, with the government of certain provinces, he always entertained feelings of jealousy and hostility. He succeeded to the throne in 1560, inheriting from his father the good will of his people, a full treasury, and a prosperous and happy kingdom, and inaugurated his reign by expending what seemed to the Swedes incredible sums on the festivals and pageants attending his coronation. Gustavus had shortly before his death made overtures of marriage to Elizabeth of England in behalf of his son; and the latter, beside keeping alive these negotiations, opened similar ones with Mary, queen of Scots, the princess Renée of Lorraine, and the princess of Hesse. He avoided the embarrassment which a favorable reply to his several offers might have caused by marrying Katrina Mänsdotter, the daughter of a petty officer of his guards, whose beauty attracted his notice as she was selling fruits in the market place of Stockholm. Katrina seems to have been sincerely attached to Eric, and remained true to him amid all his succeeding misfortunes. During nearly his whole reign he was engaged in wars with Denmark and Poland, in the course of which the Swedes acquired from the latter country the Baltic provinces of Livonia and Revel, although at great cost of men and money, whole provinces having been depopulated to supply the army. The animosity of the king toward his brothers increased with years, and finally led to violent measures. John, the eldest, was besieged in his castle at Abo, and condemned to a long imprisonment, and the others were in constant fear of their lives. Eric gradually surrendered himself to a career of tyranny under which the whole kingdom groaned. Assassination became frequent, and under the influence of the royal favorite, Göran Pehrssen, some of the oldest nobility, including the Sture family, were put to death. In the midst of these excesses he was attacked by a fit of madness, the effect of remorse, and for several days wandered alone in the forest. His oppressed brothers John and Charles having at length risen in rebellion, he marched to meet them, and after a desperate conflict was overcome and captured in 1568. He was deposed by act of the Swedish diet, and after languishing 9 years in prison, was poisoned by order of his brother John, who had succeeded to the throne. In the beginning of his reign Eric displayed energy and legislative skill, and made several judicious reforms in the civil and ecclesiastical government of the kingdom. He was a patron of art and science, and was the first to introduce the titles of baron and count into Sweden.

ERICSSON, John, a distinguished inventor and engineer, born in the province of Wermeland, Sweden, in 1803. The son of a mining proprietor, his earliest impressions were derived from the engines and machinery of the mines. In 1814 he attracted the attention of the celebrated Count Platen, the intimate friend of Bernadotte, and being appointed a cadet in the engineers, was employed as a *niveleur* at the grand ship canal, where he set out the work for more than 600 soldiers. In 1820 he entered the Swedish army as an ensign, and was soon promoted to a lieutenancy. His regiment being stationed in the northern highlands, where an accurate government survey was in progress, Ericsson surveyed upward of 50 miles of territory, detailed maps of which, executed by his own hands, are yet in the archives of Sweden. In 1826 he obtained leave of absence for a visit to England, with the view of introducing his invention of a flame engine, which he had exhibited in a machine of about 10 horse power. This engine did not meet his expectations, and involved heavy expenditures, which induced him to resign his commission, and devote himself to mechanical pursuits. Numerous inventions followed, among which may be mentioned the steam boiler on the principle of artificial draft, for the introduction of which Ericsson joined the established mechanical house of John Braithwaite. After having been applied to numerous boilers for manufacturing purposes in London with success, effecting a great saving of fuel and dispensing with the huge smoke stacks, this invention was applied to railway locomotion on the Liverpool and Manchester railway in the fall of 1829. The directors had offered a prize for the best locomotive engine, and within 7 weeks of the time of trial Ericsson heard of the offer, planned an engine, executed the working drawings, and completed the machine. The lightest and fastest engine started on this occasion was the Novelty, which, guided by its inventor Ericsson, started off at the rate of 50 miles an hour. The principle of artificial draft, which characterized this engine, is yet retained in all locomotive engines; but a different mode of producing it was accidentally discovered so soon after the display of the Novelty, that the original inventor derived no advantage from it. The lightness and compactness of this boiler led to many new applications of steam, and among others to Ericsson's construction of a steam fire engine, which was entirely successful. A similar engine of greater power he subsequently constructed for the king of Prussia. For this invention he received the prize medal of the mechanics' institute of New York. In 1833 he reduced to practice his long cherished project of a caloric engine, and submitted the result to the scientific world in London. The invention excited very general interest, and lectures were delivered in explanation and illustration of its prin-

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ciple by Dr. Lardner and by Professor Faraday. Dr. Andrew Ure, having witnessed its performance, was liberal and daring enough to say that the invention would throw the "name of his great countryman James Watt into the shade." Sir Richard Phillips records that he saw the first model machine of 5 horse power with "inexpressible delight;" but the high temperature so affected its working parts that it was not available as a practical machine. Ericsson's attention was next directed to navigation, the result of which was the invention of the propeller, and of that new arrangement of the steam machinery in ships of war which has revolutionized the navies of the world. Ericsson sought to bring these inventions to the favorable notice of the British admiralty, and was listened to with polite but incredulous attention. He took their lordships on a trial trip in a vessel constructed with his new propeller, but he could not induce them to believe what they saw. He found a more confiding listener in Capt. R. F. Stockton of the U. S. navy, by whose influence with the administration of that time at Washington, he was placed in a position to carry out his plans. In 1839 Ericsson came to New York. In 1841 he was employed in the construction of the U. S. ship of war Princeton, on the very plan which had been received with such indifference by the British admiralty. She was the first steamship ever built with the propelling machinery under the water line and out of the reach of shot. Mr. Mallory of Florida asserted, in a recent debate in the senate of the United States, that the Princeton was the foundation of the present steam marine of the whole world; and that, hereafter, in maritime war, those who send sailing vessels to sea, send them but to be captured. The Princeton was distinguished for numerous mechanical novelties beside the propeller; among which were a direct-acting steam engine of great simplicity, the sliding telescope chimney, and gun carriages with machinery for checking the recoil of the gun. In the U. S. division of the industrial exhibition of all nations in London in 1851, Ericsson exhibited the distance instrument, for measuring distances at sea; the hydrostatic gauge for measuring the volume of fluids under pressure; the reciprocating fluid meter for measuring the quantity of water which passes through pipes during definite periods; the alarm barometer; the pyrometer, intended as a standard measure of temperature from the freezing point of water up to the melting point of iron; a rotary fluid meter, the principle of which is the measurement of fluids by the velocity with which they pass through apertures of definite dimensions; and a sea lead, contrived for taking soundings at sea without rounding the vessel to the wind, and independently of the length of the lead line. For these he received the prize medal of the exhibition. In 1852 he was made knight of the order of Vasa by King Oscar of Sweden. In the same year he brought out a new form of caloric engine in the ship Ericsson. It propelled this ship of 2,000 tons from New York to Alexandria on the Potomac, in very rough weather, in the latter part of Feb. 1853. On this trip the engines were in operation for 73 hours without being stopped for a moment, and without requiring the slightest adjustment, the consumption of fuel being only 5 tons in 24 hours. At Alexandria she was visited by the president and president elect, the heads of departments, a large number of naval officers, and many members of both houses of congress, and subsequently by the foreign ministers in a body, and by the legislature of Virginia, then in session. Ericsson was invited by a committee of the legislature to visit Richmond as the guest of the state. The secretary of the navy recommended, in a special communication to congress, the passage of a resolution authorizing him to contract for the construction of a frigate of 2,000 tons to be equipped with caloric engines, and to appropriate for this purpose $500,000. This recommendation failed in consequence of the pressure of business at the close of the session. But notwithstanding the surprise and admiration that this achievement excited in the scientific world, the speed attained was not sufficient to meet the practical exigencies of commerce; and the repetition of the engines on this large scale could not be undertaken at the charge of individuals. In the midst of numerous mechanical pursuits, Ericsson has since devoted himself to perfecting the caloric engine. Step by step he has been advancing to admitted success, has developed his invention in machines with cylinders varying from a diameter of 6 inches to one of 32 inches, and is still engaged in adapting it to all the various uses which call for it. It is now applied to purposes of pumping, printing, hoisting, grinding, sawing, turning light machinery of various kinds, working telegraphic instruments and sewing machines, and propelling boats. More than 200 of these engines are in successful operation. The extent of power attainable has not been ascertained. Ericsson still labors with the vigor and enthusiasm of boyhood. While engaged in carrying out his inventions, it is a common thing for him to pass 16 hours a day at his table, in the execution of detailed mechanical drawings, which he throws off with a facility and in a style that have probably never been surpassed. (See also ATMOSPHERIC ENGINE.)

ERIDANUS, the Greek name of a large northern river which Æschylus confounded with the Rhone, but which later writers made identical with the Roman Padus, or modern Po, the chief river of N. Italy. According to Hesiod and the tragic poets, Phaëton, son of Helios, in a futile attempt to guide the chariot of his father, was struck with a thunderbolt by Jupiter, and fell into this river. His sisters, the Heliadæ, were changed into poplar trees, and their tears into amber, for which this river was chiefly famous. The name was also given to a river of Attica, which flowed into the Ilissus, near Athens.

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ERIE, the name of counties in 3 of the United States. I. A W. co. of N. Y., bordering on Lake Erie, bounded N. by the Tonewanda and S. by the Cattaraugus creek; area, about 950 sq. m., pop. in 1855, 152,407. It is drained and supplied with water power by Buffalo creek and several other small streams. In the N. part the surface is undulating, and the soil well adapted to grain; in the S. it is hilly, and here the land is more suitable for grazing. Wheat, oats, and grass are the staples. The productions in 1855 were 285,726 bushels of wheat, 724,747 of oats, 488,228 of Indian corn, 98,011 tons of hay, 1,866,132 lbs. of butter, and 2,038,392 of cheese. There were 3 manufactories of agricultural implements, 9 furnaces, 9 woollen mills, 43 grist mills, 151 saw mills, 31 newspaper offices, 155 churches, and 309 school houses. Iron ore, limestone, brick clay, and water cement are found in considerable quantities. The county is traversed by 6 railroads, and by the Erie canal, which connects with Niagara river at Black Rock, and has its terminus at Buffalo, the county seat. Organized in 1821, and named from Lake Erie. II. A co. of Penn., forming the N. W. extremity of the state, bordering on New York, Ohio, and Lake Erie; area, 740 sq. m.; pop. in 1850, 38,742. With the exception of a high ridge, several miles distant from the lake, and running nearly parallel with its shore, the surface is generally rolling and well watered. Its soil is clayey, and in the N. part produces good crops of grain. The S. portions of the county are mainly occupied by pasture lands. Grain, potatoes, maple sugar, lumber, and dairy produce are the staples. In 1850 the productions were 433,692 bushels of Indian corn, 147,825 of wheat, 433,765 of oats, 171,855 of potatoes, 69,422 tons of hay, 252,843 lbs. of butter, and 333,748 of maple sugar. There were 57 churches, 5 newspaper offices, and 9,343 pupils attending public schools. Iron is the principal mineral; slate and sandstone underlie much of the surface. Formed in 1800, and named from Lake Erie, which forms its entire N. W. boundary. Capital, Erie. III. A N. co. of Ohio, bordering on Lake Erie and Sandusky bay; area, 250 sq. m.; pop. in 1850, 18,568. It is drained by Huron and Vermilion rivers, and crossed by several railroads. Near Huron river are several ancient mounds and enclosures, and at Sandusky are extensive quarries of valuable limestone. The surface is generally level, the soil alluvial and exceedingly fertile. Grain, hay, wool, butter, and fruits are the chief staples. In 1858 the principal productions were 601,713 bushels of Indian corn, and 118,181 of wheat. Capital, Sandusky City.

ERIE, a city and the seat of justice of Erie co., Penn., situated on Lake Erie, nearly midway between Buffalo and Cleveland, on one of the finest harbors on the lakes, Presque Isle bay, nearly 5 m. long, and over half a mile wide; pop. in 1840, 3,412; in 1850, 7,290; in 1859, between 10,000 and 12,000. It is one of the principal ports on the lake, and the only important one belonging to Pennsylvania. The city stands upon an elevated bluff commanding a fine view of the lake and harbor. The streets are broad and regularly laid out at right angles, and near the centre of the city is a large and beautiful park. The custom house and post office occupy a handsome marble structure, which cost about $100,000. There are 12 churches, 2 very large first class hotels, a flourishing academy, a public library, 7 newspapers, a bank and numerous banking offices, several large flouring mills, factories of various kinds, and 2 extensive founderies and machine shops, at one of which railroad cars are manufactured. The public schools are among the best in the state. A heavy trade in coal, lumber, and staves is carried on, which gives employment to a large number of vessels and men. Large quantities of whitefish and lake trout are caught and shipped from this point. They are taken with gillnets in deep water a few miles N. of the harbor. The Lake Shore railroad passes through the city. The Sunbury and Erie railroad, which connects Erie with Philadelphia, and which (June, 1859) is rapidly approaching completion, and the Erie and Pittsburg railroad, part of which is in running order, have their termini here; and a line called the Erie city railroad, an extension of the New York and Erie railroad, has been projected. Erie is connected with the Ohio river by the Erie extension of the Pennsylvania canal. The town possesses great commercial advantages, and will probably ere long be the 3d in size and importance in Pennsylvania. It would have occupied this position already, but for a disastrous contest in 1853, '54, and '55 with the railroads, known as the "Erie railroad war." Erie is included in the collection district of Presque Isle, the foreign commerce of which for the year ending June 30, 1858, was as follows: value of exports, $49,160; of imports, $1,846; entrances, 73 vessels of 11,493 tons; clearances, 74 vessels of 10,865 tons. The enrolled and licensed tonnage of the district was 7,744. In 1794 Gen. Wayne, when on his way to the Maumee, established a garrison here; and on his return in 1796 he died in a small log cabin, and was buried at the foot of the flag-staff. His remains were removed by his son in 1809 and taken to Delaware county. The most prominent event in the history of Erie was the building and equipping of Perry's fleet during the war of 1812–'15.

ERIE, Lake, the most southern of the 5 great lakes of the N. United States and of Canada, and the lowest of the chain, except Lake Ontario, which lies below it to the N. E. The boundary line between the two countries passes through these waters. Both the lakes named lie nearly in the extension of the line of the river St. Lawrence, the outlet of all these bodies of fresh water. The mean length of Lake Erie is estimated at 240 m.; mean breadth, 40 m.; elevation above the level of the sea, 565 feet; area, 9,600 sq. m. Its surface is 333 feet above that of Lake Ontario, this great descent being made

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in the Niagara river, which connects the two lakes. The form of the lake is not very irregular, its maximum length exceeding the mean by only about 15 m., and the breadth varying from 30 to 60 m. Its western extremity receives from the N. the waters of the upper lakes, discharged by the Detroit river. At this extremity are many islands clustered together, the largest one about 14 m. in circumference. They are well wooded, with a fertile soil derived from the limestone rocks of which they are composed, and to some extent they are under cultivation. The peculiar features of Lake Erie are its shallowness and the clayey nature of its shores. While Lakes Huron and Michigan present a maximum depth of 1,800 feet, Lake Superior a mean depth of 900, and Lake Ontario of 500 feet, the maximum soundings in Lake Erie, except near its lower end, rarely exceed 120 feet. The U. S. engineers found 3 divisions in the floor of the lake, of increasing depth toward the outlet. The upper portion, above Point Pelee island, has a level bottom with an average depth of 30 feet. The middle portion takes in the principal part of the lake, extending to Long Point. The bottom is here level also, and from 60 to 70 feet below the surface. Below Long Point the depth varies from 60 to 240 feet. Its bottom is a light clayey sediment, which rapidly accumulates, as noticed in the account of the diving operations for the recovery of the safe of the steamer Atlantic. (See Diving.) The material is derived from the wearing away of the strata that compose its shores. On the S. side, from the mouth of the Cattaraugus in New York, near the E. extremity of the lake, through the strip on its coast belonging to Pennsylvania, and almost to Sandusky in Ohio, the rock formations are the Portage and Chemung gronps of the New York system, a series of easily disintegrated blue, gray, and olive shales, associated with beds of gray sandstone. The western extremity and whole N. coast is made np of the limestones of the Helderberg group, which by their decomposition form a clayey and muddy soil. Sandstones, too, are associated with these. Both sides thus furnish the materials for sediments of a nature to be readily distribnted throughout the lake. Along the coast the loosely aggregated products of the disintegrated strata are frequently seen forming high cliffs, which extend back into elevated plateans. The rivers cut deep channels through these, discharging the excavated matters into the lake. The nnderground water courses penetrate throngh the base of the cliffs and undermine them, and the waves aid to break them down. Slides are of frequent occurrence. The water takes up the earthy materials, and is rendered turbid by them a long way out from the land. This may be seen on both sides the lake; and about Cleveland in Ohio, the wearing back of the coast line has been particularly remarked. For 40 m., extending E. to Fairport, the shores are of this character, the stratified clays and sand forming a terrace, the height of which at Cleveland is 103 feet above the water. Owing to the shallowness of the lake, it is readily disturbed by the wind; and for this reason, and for its paucity of good harbors, it has the reputation of being the most dangerous to navigate of any of the great lakes. Long continued storms, with the wind setting from one extremity of the lake toward the other, produce disastrous effects upon the land to leeward by the piling up of the waters. From this cause the city of Buffalo at the foot of the lake has suffered serious damage in its lower portions. The return of the waters after the storm has in some instances been so rapid, when driven along by a wind setting in the same direction, that powerful currents are produced. In Oct. 1833, a current thus caused burst a passage through the peninsula on the N. coast called Long Point, and excavated a channel more than 9 feet deep and 900 feet wide. The natural harbors around the lake are few, and these have required artificial improvement. They are generally at the mouths of the small rivers which flow into the lake, the channels of which are carried far out into the lake by piers, constructed on one or both sides. Erie in Pennsylvania has a large natural harbor, formerly known as that of Presque Isle, which has been protected by a breakwater. The principal harbors on the S. side are those of Cleveland, Sandusky City, and Toledo. On the N. shore there is a harbor called Port Maitland, at the entrance of Grand river near the E. end of the lake, and this river is navigable for small vessels for some distance. Other harbors on the same side are Ports Dover, Burwell, and Stanley; the last the most important, as the port of the productive region of this portion of Canada. Lake Erie drains but a narrow margin of country around it, and receives no rivers of importance. The Maumee is the largest on the American side, entering the lake at its S. W. extremity, its course being nearly on the extended line of the river St. Lawrence and the two lakes Ontario and Erie. Sandusky river, further E. in Ohio, rises about 60 m. to the S. of the lake; but more to the E. the rise of the surface to the N. reaches nearly to the lake shore, determining the drainage in the opposite direction, which is that of the general slope of the strata. The lake was early navigated by sailing vessels built npon its shores. As many as 7 steamers were running npon it in 1830, and not long afterward it became the great thoroughfare of travel between New York and the N. W. states, the steamboat lines running from Buffalo to Chicago. The construction of railroads, npon which travel is more direct and uninterrupted in winter, has caused these lines to be disused. The lake is nsually closed to navigation in the early part of December, and continues more or less frozen over till March or April. In the season of navigation an immense amount of transportation is done upon it, and its commerce has been estimated to amount to the annual value of $220,000,000.

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In the year ending June 30, 1858, there were built at the American ports on the lake 136 vessels; and on July 1 of the same year the registered tonnage of these ports was 57,111 tons. On the American side there are 26 light-houses and beacons, and on the Canadian side 10. The communication with Lake Ontario is through the Welland canal, constructed across the Canadian peninsula. The fisheries of Lake Erie are of little importance compared with those of the upper lakes, where the same kinds of fish are more abundant and of better quality. The chief varieties taken are lake trout and whitefish; other varieties are sturgeon, sisquit, muskelonge, black bass, white bass, and Oswego bass, several species of pike, &c.—BATTLE OF LAKE ERIE. In the war of 1812 between the United States and Great Britain, the naval superiority on Lakes Erie and Ontario became an object of much moment to the belligerents, and corresponding efforts were made on both sides to secure it. The general command of the American naval forces in these lakes was held by Commodore Isaac Chauncey, who was employed on Lake Ontario, while the immediate command on Lake Erie was given to Master Commandant Oliver Hazard Perry of Rhode Island, who at the time he was assigned to this important service was only 27 years of age. A squadron of 9 sail was equipped by Perry at Erie. The enemy had command of the lake, and maintained a close blockade of the port while the squadron was preparing for service, and had they been more enterprising would doubtless have destroyed it before it was ready. Early in Aug. 1813, Perry managed to get his squadron out of the port, which was effected with great difficulty; and on the morning of Sept. 10, while lying in Put-in bay, a harbor among the Bass islands, near the W. extremity of the lake, he discovered the British squadron in the offing, and immediately went out to meet it. This squadron consisted of 6 sail, commanded by Commodore Robert Heriot Barclay, an officer of experience, who had served under Nelson at Trafalgar. As the Americans stood out, it was discovered that the enemy had hove to on the port tack in a compact line ahead, the wind light from the S. E. The British line was composed as follows: The schooner Chippeway, of 1 long 9-pounder; the flag ship Detroit, of 19 guns, principally long 24 and 12-pounders; the brig Hunter, of 10 guns of light calibre, principally long 6 and 4-pounders, and 12-pound carronades; the ship Queen Charlotte, of 17 guns, long 12s and 9s and 24-pound carronades; the schooner Lady Prevost, of 13 guns, long 9s, 6s, and 12-pound carronades; schooner Little Belt, of 3 guns, 1 long 12-pounder and 2 long 6s; in all, 6 vessels, mounting 63 guns, with 502 officers and men. Perry so formed his line as to bring the heaviest of his vessels opposite the heaviest of the enemy. Selecting the flag ship Detroit as his antagonist, he took the lead in the Lawrence brig of 20 guns, 2 long 12s and 18 32-pound carronades. The schooner Scorpion, Sailing Master Champlin, mounting 1 long 24 and 1 32-pound carronade, was stationed ahead of the Lawrence, and the schooner Ariel, Lieut. Packett, of 4 short 12-pounders, on her weather bow. The brig Caledonia, Lieut. Turner, of 3 long 24-pounders, came next to engage the Hunter. The Niagara, Master Comdt. J. D. Elliott, of 20 guns, 2 long 12s and 18 32-pound carronades, came next to engage the Queen Charlotte. The Somers, Sailing Master Almy, 2 long 12-pounders; the Porcupine, acting Sailing Master Senat, 1 long 32-pounder; the Tigress, Lieut. Conklin, 1 long 24-pounder; and the Trippe, Lieut. Holdup, afterward Captain Thomas Holdup Stevens, 1 long 32-pounder, were stationed in the rear to engage the Lady Prevost and Little Belt. In all, 9 vessels, mounting 54 guns, with 490 officers and men. Of these 9 vessels, two only, the Lawrence and Niagara, could be considered regular vessels of war. The others, having for the most part been built for commercial purposes, were very slight and without bulwarks. The guns of the Americans were generally of heavier calibre than those of the British squadron, though they were 9 fewer in number. The force of the British as to weight of metal has been variously stated, though all accounts agree as to the vessels and the number of guns. It seems beyond doubt that the two squadrons were of nearly equal strength. Perry's line was formed about 10 A. M., when it bore up for the enemy; the Lawrence bearing at her main a square blue flag, upon which were the dying words of Lawrence: "Don't give up the ship." The day was beautiful and very bright, and the lake perfectly smooth. The American squadron steered for the head of the British line, upon a course which formed an angle of about 45° with it. At about 11 h. 45 m. the Detroit opened her fire upon the Lawrence; signal was now made for each vessel to engage her designated opponent, and in a few minutes the action with the leading vessels became general and extremely severe. The British fire seems to have been at first principally directed upon the Lawrence, which suffered terribly. At 2 h. 30 m., out of 101 persons who composed the complement of that vessel when she went into action, there were only 18, including Perry himself, not disabled; 22 had been killed, 61 wounded, and every gun rendered ineffective by shot. In this desperate condition of his own vessel, Perry determined to shift his flag to the Niagara; and leaving the Lawrence in command of Lieut. Yarnall, he started in his boat for that vessel, then about half a mile to windward. His passage to her was a perilous one, the shot falling thickly around his boat, and covering her crew with spray. The Lawrence continued to be the main object of the enemy's fire, and being reduced to a mere wreck, was compelled to strike soon after Perry left her. Later in the engagement, however, her colors were again hoisted. As Perry crossed the gangway of the Niagara, Capt. Elliott

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volunteered to bring up the small vessels, which, owing to the lightness of the wind, and their very dull sailing, had as yet taken but little part in the engagement. Perry gladly acceded to this proposition, and Elliott immediately left the Niagara to execute it. At this moment she was about 500 yards to windward of the principal force of the enemy, nearly abeam of the Detroit, and had suffered very little. Perry, ordering the signal for close action to be made, bore up, and passed through the enemy's line, raking for some time at close quarters, with destructive effect, the Detroit and Queen Charlotte, which at this critical moment had fouled each other. The Caledonia, and the smaller vessels which had now come up, were closely engaging the British to windward; and their vessels being thus under a heavy cross fire, the Detroit, Queen Charlotte, Lady Prevost, and Hunter struck at 3 o'clock, their colors coming down about 7 minutes after Perry opened his fire with the Niagara. The Chippeway and Little Belt endeavored to escape to leeward, but were pursued by the Scorpion and Trippe, to which vessels they surrendered about an hour later. On taking possession of the British vessels, they were found to be very much cut to pieces, especially the Detroit and Queen Charlotte. Their loss was 41 killed, including the gallant Capt. Finnis of the Queen Charlotte, and 94 wounded, 9 of whom were officers. Commodore Barclay was carried below severely wound ed early in the action, but soon returned to his deck, where he remained until he received another serious wound by a grape shot in the right shoulder. Toward the close of the action, when informed that further resistance was impossible, this heroic officer caused himself to be again carried on deck, that he might be convinced of the fact by personal observation. The American vessels also suffered severely. Their loss was 27 killed, including Lieut. John Brooks and Midshipman Laub of the Lawrence, and Midshipman Clark of the Scorpion. Commodore Perry bestowed high encomiums in his official report upon his officers and men generally, particularizing Capt. Elliott, Lieuts. Yarnall, Smith, Edwards, Turner, and Packett; Capt. Brevoort of the 9th infantry, who volunteered for duty as marine officer; Sailing-Masters Taylor and Champlin; Pursers Hambleton and McGrath; Midshipmen Forrest, Laub, Clark, Swartout, Webster, and Claxton. The greatest attention was bestowed upon the wounded prisoners, which was handsomely acknowledged by the enemy, and a lasting friendship sprang up on this occasion between Barclay and Perry. Commodore Barclay subsequently, on a public occasion in Canada, declared that "Perry's humanity to his prisoners alone would have immortalized him," and gave as a toast: "Commodore Perry, the gallant and generous enemy." The results of the action were highly important. The American naval supremacy on the lake was completely established, and the U. S. squadron, together with such of the captured vessels as could be used for the service, coöperated efficiently with Gen. Harrison by transporting troops and stores. Detroit, which had been captured by the British, was immediately evacuated, and the whole territory of Michigan was released from the occupation of the British army and from the horrors of an Indian warfare which had prevailed there. Congress bestowed gold medals upon Perry and Elliott for their conduct in the action, and appropriate rewards upon the officers and men generally. The remains of the officers killed in the battle were buried at Put-in-bay island, and on Sept. 10, 1858, the corner stone of a monument in commemoration of the victory, and in honor of the dead, was laid on this island with imposing ceremonies. The remains of Perry's flag ship Lawrence and the Niagara are sunk in the N. side of the bay at Erie.

ERIGENA, John Scotus, a scholastic philosopher, born near the beginning of the 9th century, in one of the British isles, history does not determine which. His name Scotus is supposed to favor the claim of Scotland to have given him birth, and Erigena that of Ireland; but the latter is the more probable, especially as Ireland was the original seat of the Scots. The same obscurity covers the last years of his life; it is probable that he died about 875, but whether in France or England is uncertain. The most learned doctor and extraordinary thinker of his time, his life is best explained by supposing him to have been educated in Ireland, where, as it is reported, a colony of philosophers had preserved almost intact, during the tumults of barbaric invasion, the traditions of the Alexandrian school of philosophy elsewhere completely lost. Some old annalists identified him with another John who died a martyr, by which confusion Erigena enjoyed, in some localities, the honor of saintship. According to a contemporary writer, Prudentius, bishop of Troyes, he was not a priest, and belonged to no religious order. He passed over to France, to the court of Charles the Bald, before 847, where he was placed at the head of the school of the palace, and where he engaged in the grave religious discussions of his time, concerning grace and the eucharist, and in sublime philosophical speculations which had been rare since the death of Proclus. The esteem in which he was held is shown by the double task which the king imposed upon him, of translating into Latin the Greek works of the pseudo Dionysius the Areopagite, and of composing a treatise against the doctrines of Godeschalc or Fulgentius about predestination. He says in one of his works that he feared neither authority nor the fury of unintelligent minds enough to make him hesitate to declare loudly what his reason made evident to him, and his writings manifested a freedom of thought and a philosophical audacity which quickly alarmed those who had invoked his aid. He affirmed the eucharist to be a remembrance or commemoration of the sacrifice upon

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the cross; and in answering those who annihilated the freedom of the will, he elevated the moral nature of man to the exclusion of the efficacy of grace. His views were condemned by the councils of Valencia in 855, and of Langres in 859, and Pope Nicholas I. demanded his disgrace of Charles the Bald. From this point information concerning his career is entirely wanting, and though there are traditions of his having resided at Oxford, it is not certain that he left France, or that the king obeyed the mandate of the pope. Many of his works are lost, including the treatises *De Corpore et Sanguine Domini*, *De Visione Dei* (excepting an unimportant fragment), and *De Egressu et Regressu Animæ ad Deum*. His most important work remains, *De Divisione Naturæ*, which was first published at Oxford in 1681, and was republished in 1838, with notes by Schüter, at Münster in Germany. A complete abstract of it is given in Sharon Turner's "History of the Anglo-Saxons." It contains all his philosophy, in the form of a dialogue between master and pupil upon the universe, nature, and what is termed that grand universality of being which embraces at once God and man. The human intelligence is, according to him, inhabited by emanations from the divine intelligence; our ideas are pure theophanies, or manifestations of the Creator in his creature. He divides nature into 4 categories: 1, God, who possesses and diffuses life; 2, the first causes or eternal ideas by which he accomplishes his work; 3, the sensible world of the creation, of which man is the summit; 4, God as he shall be at last when the perfected world, its destiny being accomplished, shall return to him. He seeks with anxious enthusiasm to place the world and man in the bosom of the Deity, and to robe them with divinity. It is remarkable that, though his writings upon ecclesiastical dogmas were quickly condemned, there was no one in the 9th century either at court or in the church able to understand his philosophical views. It was not till the 13th century that the council of Paris discovered their pantheistic character, and condemned them. After the barbarous ages which followed the northern invasions, Erigena rose suddenly to the heights of metaphysics, undertook to reduce the Christian faith to a scientific system, and founded the philosophy of the middle ages. He was intimate with the ideas of Plotinus, Proclus, and the Greek fathers, and has been ranked as at once the last of the Neo-Platonists, and the first of the scholastics.

ERIOMETER (Gr. *εριον*, wool, and *μετρον*, a measure), an instrument invented by Dr. Thomas Young for determining the diameters of delicate fibres, as those of wool, and also the diameters of minute globules, as those of the blood, &c. Its principle depends upon the fact that a portion of the shadows cast by these small objects, placed in front of a strong light, assumes the form of concentric circles of the different colors of the spectrum; the diameter of these circles being proportionate to that of the objects, and also to the distance of these from the surface upon which the circles are formed. The instrument is thus described in Brewster's "Optics": "It is formed of a piece of card or a plate of brass, having an aperture of about $\frac{1}{36}$ of an inch in diameter, in the centre of a circle about $\frac{1}{4}$ inch in diameter, and perforated with about 8 small holes. The fibres or particles to be measured are fixed in a slider; and the eriometer being placed before a strong light, and the eye assisted by a lens applied behind the small hole, the rings of colors will be seen. The slider must be then drawn out or pushed till the limit of the first red and green ring (the one selected by Dr. Young) coincides with the circle of perforations, and the index will then show on the scale the size of the particles or fibres."

ERIVAN, or RUSSIAN ARMENIA, a Trans-Caucasian government of Russia, divided into 7 circles, bounded N. and E. by Georgia, S. by Persia, W. by Turkish Armenia; area, about 6,000 sq. m.; pop. about 410,000, of whom 120,000 are nomadic and gypsy tribes, who are all Mohammedan, while the rest are Armenians. The principal river is the Aras or Araxes. The principal mountain is Mt. Ararat in the south. The country is rich in salt, and in gold, silver, and other minerals. Although the government is still frequently called Erivan, after its Persian name Rewan, its more recent denomination is Russian Armenia.—ERIVAN, the fortified capital, is situated on the Zenghi, an affluent of the Aras, 40 m. N. E. from Mt. Ararat, and 116 m. S. W. from Tiflis; pop. 15,000. It is the seat of an Armenian patriarch, who resides in a monastery in the vicinity, has a beautiful mosque, a large bazaar, a cannon foundery, and manufactories of morocco leather and of cotton fabrics. It is strongly fortified, is a station for caravans from Tiflis and Erzroum, and has considerable trade with Turkey, Persia, and Russia. It is thought to have been founded by an Armenian king in the 1st century of our era, and formerly occupied a site nearly one mile distant from its present position, to which it was transferred in 1635. In the vicinity, on a lofty rock, is an immense oval citadel, and the remnants of ruined cities are found in the surrounding plain. In the 16th century it became the residence of the Persian kings of the Sophian dynasty. Several times besieged and captured by the Turks, it returned under Persian domination about the middle of the 18th century. The Russians were repulsed from it in 1808, but took it in 1827, and their general Paskevitch received the surname of Erivanski. It was confirmed to the Russians by treaty in the following year.

ERLACH, a district in the Swiss canton of Bern; pop. 6,570. Its chief town, of the same name, on the lake of Bienne, and on a spur of the Jolimont (pop. about 1,000), contains the castle of Erlach, the cradle of the noble Swiss family of that name. Many of its members were emi-

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nent generals, and sturdy champions of the liberties of Bern.—Rudolph of Erlach achieved, July 21, 1339, a brilliant victory at Laupen over the count of Nydau and his allies. He was as generous as he was brave, and became the tutor and protector of his enemy's children. He was murdered in 1360 by his son-in-law, Jost von Rudens.

ERLANGEN, a town of Bavaria, in the circle of Upper Franconia, on the river Regnitz, on the railway from Bamberg to Nuremberg, and on the *Ludwigs-Kanal;* pop. 11,000. It has a famous university, opened Aug. 23, 1743, which is the only Protestant institution of the kind in Bavaria. It is attended on an average by about 500 students, and possesses faculties of theology, medicine, &c., a museum of natural history, a botanic garden, and a library of about 100,000 volumes. Erlangen is renowned among German towns for the pleasantness and cheerfulness of its appearance. It is divided into an old and new town. The latter is especially well built, and owes its origin chiefly to French Huguenots, to whom it was assigned as a residence by Margrave Christian Ernest in 1686, after the revocation of the edict of Nantes. In remembrance of this prince, the new town is frequently called Christian Erlangen. The town has manufactories of hosiery and gloves, and many breweries. A monument, designed by Schwanthaler, in honor of Margrave Frederic of Baireuth, the founder of the university, adorns the public square. There are 5 churches in the town: 2 Lutheran, 1 Dutch Reformed, 1 French Reformed, and 1 Roman Catholic. A convention of German naturalists was held here in 1840, and of German philologists and orientalists in 1851.

ERLAU (Hung. *Eger*), a town of Hungary, capital of the county of Heves, situated in a deep and charming valley, on the river Erlau, an affluent of the Theiss; pop. 18,400, chiefly Roman Catholics and Magyars. It has weekly fairs, linen and cloth manufactories, and an important trade in wine, Erlau wine being the best red wine of Hungary. There are 2 warm springs here, much resorted to for diseases of the skin. The town has 4 suburbs and many stately public buildings. The cathedral, the episcopal palace, several churches, and the hospital founded by Komáromy, are the most notable edifices; and the college (formerly the university), with library and observatory, is the principal learned institution. Erlau, important as a bishopric from the time of St. Stephen, became the seat of an archbishop in 1804. In former times, though it possessed strong fortifications, it suffered much from the Tartar and Turkish invasions, especially in 1552, when it repulsed under the heroic Stephen Dobó the repeated assaults of an immense Turkish army, and in 1596, when it was given up to the Turks by the foreign part of the Austrian garrison. Among the remnants of the old fortress the tomb of Dobó is still shown to visitors. Erlau was conspicuous during the revolution of 1848–'49 for the patriotic spirit of its inhabitants, and as the place whence both Dembinski and Görgey started for their chief campaigns against the Austrians under Windischgrätz.

ERMAN, Paul, a professor of physical science at Berlin, born in 1764, died Oct. 11, 1851, officiated first at the French gymnasium in Berlin, then in the military school, and, when the university was established, at the latter institution until his death. His contributions to science embrace a wide range of subjects, and more especially magnetism and electricity. Having been for some time the academical secretary for the physical sciences, he became on the reorganization of the academy joint secretary, with the celebrated astronomer Encke, of both the physical and the mathematical class. The galvanic prize instituted by Napoleon I. was awarded to him by the French academy of sciences in 1806.—Georg Adolf, son of the preceding, born in Berlin in 1806, pursued at the university the study of natural history, which he afterward continued at Königsberg under the instruction of Bessel, whom he accompanied to Munich on a scientific journey. Between 1828 and 1830 he performed at his own expense a journey round the world, chiefly with the object of making a series of magnetic observations. Hansteen, who had been sent by the Swedish government on a similar expedition to western Siberia, was his fellow traveller as far as Irkootsk. Here the two savants parted company, Erman proceeding alone to Kamtchatka, whence he sailed to the Russian colonies in America, and, by way of California, Tahiti, Cape Horn, and Rio Janeiro, returned to St. Petersburg and Berlin. A description of his journey is embodied in his *Reise um die Erde, durch Nord-Asien und die beiden Oceane in den Jahren* 1828, '29, *und* '30 *ausgeführt, in einer historischen und einer physikalischen Abtheilung dargestellt* (5 vols. 8vo., Berlin, 1833–'48). An English translation of a portion of his travels, by W. D. Cooley, entitled "Travels in Siberia, including Excursions Northward down the Obi to the Polar Circle, and Southward to the Chinese Frontier," appeared in London, in 1848 (2 vols. 8vo.). He has also published separate works on the courses of the river Obi and on the animals and plants collected by him on his journey, and has contributed largely to Poggendorff's *Annalen* and other scientific periodicals. Since 1841 he has edited the *Archiv für wissenschaftliche Kunde von Russland*, which is exclusively devoted to new scientific researches, connected with the geography, ethnology, and geology of Russia. Many Russian savants coöperate with Erman in this publication, which is one of the best authorities on the subjects of which it treats. He is now (1859) professor of physical science at the university of Berlin.

ERMINE, a name given to several weasels, of the genus *putorius* (Cuv.), inhabiting the northern parts of both hemispheres, and which in the winter season exchange their brown color for a white livery more or less pure. The

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European ermine (*P. erminea*, Linn.) is about 10 inches long, with the tail half the length of the body; in the summer season it is reddish brown above, whitish below, with the tip of the tail black; in this livery it is called the stoat in Great Britain. In the winter, however, the upper parts become white, with a yellow tint beneath, the tip of the tail remaining black at all seasons; in this color the fur was formerly highly prized, especially for ornamenting garments pertaining to royalty and offices of dignity; for the purity of its whiteness it was taken as the emblem of the incorruptibility and the integrity which should characterize a judge. This animal is widely distributed in northern Europe and Asia, extending its range even to the highest latitudes visited by man. Its habits are sanguinary, like those of all of its genus, though from its smaller size it does less mischief in the farm yard than the polecat; it attacks and kills rats, mice, moles, and young poultry, sucking their blood; it often domesticates itself in houses, where its destruction of rats and mice in part compensates for its damage to the farmer in the hen house. There are at least 5 North American weasels entitled to the name of ermine; but it is very improbable that the *P. erminea* is found upon this continent. The animal called ermine by Audubon and Bachman, and considered by them the same as the European animal, was first described as a distinct species by Dekay as *P. Noveboracensis*. The color in summer is chestnut brown above, whitish below and on the inner surface of the limbs; edge of upper lip white, and end of tail black; in winter, in northern latitudes, the hairs are snowy white from the roots, except on the end of the tail, which is black for about 1¼ inches; south of Pennsylvania the change to white does not take place, the color remaining brown throughout the year. The head is depressed and acute; the ears are large and extend far round the meatus; the body is elongated, and the tail cylindrical, thickly clothed with fur about 1¼ inches long at the end; the limbs are short and stout; there are 5 toes on each foot, the inner the shortest, all covered with fur, which hides the naked pads on the soles; on each side of the under surface of the tail are glands which secrete an offensive musky fluid. The fur is short, but very soft. The length to root of tail is 10½ to 11 inches; length of tail to end of hair 6½ to 7 inches, the bones extending about 5½ inches. It is a graceful, quick, and fearless animal, living under logs and heaps of stones, and in holes in rocks. It destroys rabbits, partridges, and domestic fowls much larger than itself; satiated with the blood of a single victim, it kills all within its reach from an instinctive propensity to kill; it has been known to destroy 40 fowls in a single night; from its vermiform body it is able to pursue hares into their burrows and the field mice into their galleries. Though occasionally destructive to poultry and eggs, it is much more a benefactor to the agriculturist by killing the mice which devour his grain, potatoes, and grasses; it will soon rid a granary of the largest rats, and a field of the wheat-loving ground squirrels. It is not shy, and has been so far domesticated as to be employed like the ferret of Europe in hunting hares; it is easily taken in any kind of trap. It is not common anywhere; it prefers stony regions, and is solitary and nocturnal in its habits, though occasionally seen at all hours of the day. It is a poor swimmer and avoids water, and rarely ascends trees except when pursued. The young, from 4 to 7 in number, are born between the last of March and the last of May, according to latitude. The coat is shed twice a year, in October and March, the autumn fur becoming white, and the spring brown. According to Mr. Baird, this species cannot be certainly traced N. of Massachusetts nor W. of Wisconsin; it has been taken at Fort Smith, Ark., and probably is found in most of the southern and southwestern states at a distance from the sea coast. The most striking differences between this and the European ermine are, that in the latter the caudal vertebræ are only ¼ the length of the head and body, the terminal hairs being nearly ⅔ their length, or from 1½ to 2½ inches; while in the former these vertebræ are nearly ½ the length of the body, the hairs being only about ¼ of their length, or not more than 1½ inches; in our species the ears and naked portion of the nose are larger; the coloration also differs in the much greater extension of the light colors on the lower parts and inside of the limbs in the European animal, and in the greater comparative extent of the black tip to the tail; there are 4 sacral and 21 caudal vertebræ in our ermine, and only 3 of the former and 19 of the latter in the European. The little ermine (*P. Richardsonii*, Bonap., or *P. agilis*, Aud. and Bach.), which replaces the preceding species north of Massachusetts, is from 8 to 9 inches long, exclusive of the tail, which is slightly more than 5; the color in summer is dark chestnut brown above and whitish below, with the whole upper jaw brown, and the end of tail black ¼ to nearly ½ of its length; in winter white with a black-tipped tail. It is smaller and darker, with more slender and delicate feet, than the preceding species; its geographical distribution is from 65° N. to Massachusetts on the E. and Vancouver's island on the W. coast. The long-tailed ermine (*P. longicauda*, Rich.) approaches the ferrets in size, being about 11 inches long exclusive of the tail, which is 6 to 7 inches; the color in summer is light olivaceous brown above, and brownish yellow below, with the chin and edge of upper lip white; in winter white, with a black-tipped tail; the muzzle is broad, the hair short, coarse, and stiff, and the ears low and short; the feet are large, with well developed claws. It is found about the upper Missouri and Platte rivers. The least ermine (*P. cicognanii*, Bonap., or *P. fuscus*, Aud. and Bach.) has an average length of 8 inches, with a tail of 3 or 4 inches; the colors are as in the other species in summer

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and winter; the edge of the upper lip is white; it is found from Labrador to Massachusetts, and as far west as Puget's sound. Kane's ermine (*P. Kaneii*, Baird) is about 8½ inches long, with a tail of 4 inches; it seems a miniature of the European species, and is found in Siberia and the vicinity of Behring's straits.

ERNEST AUGUSTUS, king of Hanover, 5th son of George III. of England, born Jan. 5, 1771, died Nov. 18, 1851. He was for many years a member of the British house of lords as duke of Cumberland, and was a field marshal in the British army. Against the desire of his mother he married, in 1815, Frederica Caroline of Mecklenburg-Strelitz, whose first 2 husbands, Prince Louis of Prussia and the prince of Solms-Braunfels, had both died. The grant which he asked from parliament on occasion of his marriage not being accorded to him, he took up his residence in Germany, but returned to England in 1829 to vote against the Catholic emancipation bill, although it was proposed by his former political friend, the duke of Wellington. His conduct on this occasion was severely censured by his brother the duke of Clarence, afterward William IV. He again applied to parliament for money, for the education of his son (George Frederic, the present king of Hanover), but as it was only granted under condition that the young prince should be instructed in England and in the spirit of English institutions, he was compelled to remove his family from Germany. Grave imputations upon his private character, and his unbending opposition to all popular reforms, combined to make his residence in England as disagreeable to himself as it was hateful to the people. On the death of William IV. (June 20, 1837), the crown of Great Britain devolved on Queen Victoria, and the succession to the throne of Hanover being limited to the male line, the two countries were separated, and the duke of Cumberland, eldest surviving brother of William, ascended the throne of Hanover under the name of Ernest Augustus. Here he became notorious for his tyrannical disposition. His first act was to abrogate the constitution of 1833, which had been sanctioned by William IV. In 1848 he yielded for a time to the exigencies of the moment, and granted a more liberal constitution. Shortly before his death, he concluded a treaty with Prussia, by which Hanover joined the German *Zollverein* (Sept. 7, 1851). He was succeeded by his son, Georg V. (born May 27, 1819), the present king of Hanover.

ERNEST I., duke of Saxe-Coburg-Gotha, born Jan. 2, 1784, died Jan. 29, 1844, succeeded his father, Duke Francis, on the throne of Coburg as Ernest III., Dec. 9, 1806. He was successively connected with the Prussian and Austrian armies, in the war against Napoleon, during which his duchy was for some time in the possession of the French. In reward for his services against Napoleon, territory comprising a population of about 25,000 was added to his duchy, including the principality of Lichtenberg, which he sold in 1834 to Prussia for 2,000,000 thalers. He invested this amount in the acquisition of various domains; and by the extinction of the Gotha line of dukes in 1826, he became duke of Gotha, and thus the first duke under whose sceptre Gotha and Coburg were united. He was an enlightened prince, a zealous patron of science and letters, and endowed his country, and especially his capital, with many beautiful structures and valuable institutions. He was the father of Prince Albert, consort of Queen Victoria.—ERNEST II. of Saxe-Coburg-Gotha (or Ernest IV. of Saxe-Coburg), son of the preceding, born June 21, 1818, married in 1842 a daughter of the grand duke of Baden. He gave to his people a new and more liberal constitution, fought against Denmark in 1849, and is distinguished for his literary and musical attainments and for his conciliatory disposition in politics. He has composed several operas.

ERNESTI, JOHANN AUGUST, a German philologist, born in Tennstädt, Thuringia, Aug. 4, 1707, died in Leipsic, Sept. 11, 1781. His critical editions of Greek and Roman classics, Xenophon, Homer, Callimachus, Polybius, Suetonius, Tacitus, and Cicero, are justly celebrated to this day, especially the edition of Cicero's writings, and the glossary appended thereto, *Clavis Ciceroniana* (6th ed., Halle, 1831). His excellent Latin style obtained for him the surname of the German Cicero. As a theological writer he belonged to the school of rationalists. His most distinguished theological work is his *Institutio Interpretis Novi Testamenti* (3d ed. 1775), of which an English translation, by C. H. Terrot, appeared in Edinburgh (2 vols. 12mo., 1833–'43).—His nephew, AUGUST WILHELM (1733–1801), edited the works of Livy (1769) and Ammianus Marcellinus (1773), beside many others.

ERNST, HEINRICH WILHELM, a German violinist, born in Brünn, Moravia, in 1814. He studied in the musical conservatory of Vienna, where Mayseder and Paganini befriended and instructed him, and subsequent to 1831 in that of Paris. From being known chiefly as a performer at chamber concerts in the latter city, he gradually extended his reputation over Europe, where he has for many years ranked among the first living violinists. As a composer for the violin he has produced the "Elegy," a "Carnival of Venice," and other successful pieces.

EROS, in Greek mythology, the god of love, first mentioned by Hesiod. He was the impersonation of the elemental principle of love, the first god who sprang into being from the world's egg, harmonizing the discordant elements of the universe and binding human kind together in sympathy. The Eros of the later poets, very different from the cosmogonic Eros, was a wanton and handsome youth, the son of Aphrodite and Zeus, and the inspirer of violent sensual passion. He is the Cupid of the Latin poets. (See CUPID.)

EROSTRATUS, or HEROSTRATUS, an Ephesian who lived in the middle of the 4th century B. C., and whom a deed of infamy has entitled to

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a place in history. On the night in which Alexander the Great was born, in the year 356 B. C., he set fire to the temple of Artemis at Ephesus, which was speedily burned. When it was ascertained who had perpetrated the sacrilege, the incendiary was arrested and put to the torture. Being asked what had prompted him to the commission of such an act, he replied: "A yearning for immortality," whereon the Ephesians passed a decree consigning his name to oblivion; but this ordinance proved a vain measure, for Theopompus secured to the criminal the object of his aspiration, by making mention of him in his history.

ERPENIUS, or VAN ERPEN, THOMAS, a Dutch orientalist, born in Gorkum, Sept. 7, 1584, died in Leyden, Nov. 18, 1624. He was educated at the university of Leyden, travelled in England, France, Germany, and Italy, and perfected himself at Paris and Venice in Arabic, Turkish, Persian, and Ethiopic. In 1612 he returned to Holland, was appointed oriental professor at the university of Leyden, and established a press in his own house for the printing of Arabic works. He was subsequently appointed oriental interpreter to the Dutch government, in which capacity he had not only to translate, but also to reply to the various despatches of the Asiatic and African princes, which the extent of the Dutch commerce at that time rendered very numerous. He wrote many important works, especially on subjects connected with the Arabic.

ERRARD, CHARLES, a French painter and architect, born in Nantes in 1606, died in Rome, May 15, 1689. He was instructed in painting by his father, and perfected his knowledge at Rome. On his return to France he gradually rose to eminence in his profession. In 1648 he became one of the 12 founders of the academy of painting. He was engaged in the decoration of the *Palais royal*, Louvre, and other palaces. His chief claim to notice rests, however, upon his connection with the foundation of the French academy at Rome, which was projected by him and carried into effect in 1666, with 12 pupils.

ERSCH, JOHANN SAMUEL, a German cyclopædist, born in Grossglogau, Prussian Silesia, June 23, 1766, died in Halle, Jan. 16, 1828. He attended in his youth the university of the latter town and that of Jena, and was afterward connected in Halle with Meusel's learned periodical, *Das gelehrte Deutschland*, and in Jena with a political journal. He published a voluminous collection of the documents found in German political, geographical, and scientific periodicals (*Repertorium über die allgemeinen deutschen Journale und andere periodische Sammlungen für Erdbeschreibung, Geschichte, und die damit verwandten Wissenschaften*, 3 vols. 1790–'92). The appearance of this work created a great sensation among German bibliographers. His efforts were so much encouraged by Hufeland and other prominent savants, that he was induced to undertake a digest of literature in connection with a general literary gazette. This work is singularly characteristic of German elaborateness. No fewer than 8 volumes (*Allgemeines Repertorium der Literatur*, Jena and Weimar, 1793–1809) were required to epitomize the literary productions of 15 years (1785–1800). It should, however, be borne in mind that not only books, but also newspaper and magazine articles, were recorded in this publication; and one of the most extraordinary features of it was, that even the criticisms to which the respective literary productions had been subjected were referred to with the utmost precision, different marks being used to designate the adverse or favorable character of the comment. While this was in progress, he projected a universal cyclopædia of modern literature, which he carried out so far as to publish 5 volumes on French literature, *Das gelehrte Frankreich*, and also an edition of the same in French under the title of *La France Littéraire* (1797–1806). He was also engaged during the same period in various editorial labors. In 1803 he was invited to fill the chair of geography and statistics at the university of Halle, and from 1808 to the time of his death he acted at the same time as chief director of the university library. He crowned the labors of his life by establishing in conjunction with Gruber *Die allgemeine Encyklopädie der Wissenschaften und Künste*, the 1st section comprising from A to G, of which 17 volumes (the first appearing in Leipsic in 1818) were edited by Ersch and Gruber. After Ersch's death that section was continued by Gruber, and on his death in 1851 by M. H. F. Meier and Hermann Brockhaus. The 2d section, to comprise the letters H to N, is under the editorial care of A. G. Hoffman of Jena, and the 3d and last section, from N to Z, under that of M. H. F. Meier of Halle. The total number of volumes published in June, 1859, was 125. This is the most learned and elaborate German cyclopædia extant, and the greatest literary achievement in Germany of the present century. A 3d edition of his *Handbuch der deutschen Literatur seit der Mitte des 18-ten Jährhunderts bis auf die neueste Zeit* (2 vols., Amsterdam and Leipsic, 1812–'14; new and enlarged ed., Leipsic, 1822–'28) was prepared by Geissler, who added to it a cyclopædia of philology in 1845 and of philosophical literature in 1850 (*Bibliographisches Handbuch der philosophischen Literatur der Deutschen von der Mitte des 18-ten Jahrhunderts bis auf die neueste Zeit*, Leipsic, 1850, 8vo.). Thus the first foundation for a thorough modern German system of bibliography was laid by Ersch's indefatigable industry, while his enthusiasm for cyclopædias has enriched the world with imperishable storehouses of information.

ERSE, or EARSE (*Hersish*), the language of the Gael in the highlands of Scotland, they being supposed to be an Irish (Erse) colony. *Gaelic Albanach* is the name given to it by the highlanders themselves, who were driven northward by the Cymri, and hence were called Scots (*scuits*, fugitives). This language, the

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Manx of the isle of Man, and the Erinakh or Irish of Ireland, constitute one branch of the Celtic or Gallic family; the other branch consisting of the Cymric of Wales, the now extinct Cornish, and the Breizad (*Bas-Breton*) in France. The term Erse has also been erroneously applied to the Scandinavians, and especially to their language. Grant (1844) attempted to derive the Gaelic from the Pelasgic. R. A. Armstrong proves it to be nearer to the ancient Celtic than is the Welsh or the Irish, and that it has fewer inflections. Dr. Prichard and A. Pictet have shown the Celtic tongues to be of the Indo-European class. The Gaelic was not written till after the arrival of the Romans in Great Britain. No ancient inscriptions or manuscripts in it have yet been discovered. Its so called Irish alphabet consists of 18 letters, nearly of Anglo-Saxon shape, named from trees (*ailm*, elm; *beithe*, birch; *coll*, hazel, &c.). The letters *k*, *q*, *v*, *x*, *y*, and *z* are wanting. Many consonants are not pronounced. The pronunciation varies in different periods and localities. Dr. Stewart, who translated the Scriptures, and Dr. Smith, who made a metrical version of the Psalms, both settled the orthography. The indefinite article, the neuter gender, and a special form for the present tense of the verbs, are wanting in Gaelic. There are 2 declensions and 2 conjugations. A peculiar metaphony is much used, as: *fear*, a man; *fir*, of a man; *fhir*, O man! The system of prefixes and suffixes resembles that of the Semitic tongues. The numerals are: *aon*, *a h-aon*, 1; *dhà*, *a dhà*, 2; *trì*, 3; *ceithir*, 4; *cuig*, *coig*, 5; *sè*, *sia*, 6; *seachd*, 7; *ochd*, 8; *naoi*, *naoth*, 9; *deich*, 10; *aon deug*, 11, &c.; *fichead*, 20; *deich ar fhichead*, 30 (10+20); *da fhichead*, 40 (2×20), &c.; *ceud*, *ciad*, 1,000, &c. The nominative plural is formed by adding *ean*, as *clàr sairean*, harpers. The sexes are distinguished by 3 methods: by different words, by prefixing *ban* or *bain* for feminines, and by an adjective. The personal pronouns are: *mi*, *mhi*, I; *tu*, *thu*, thou; *e*, *se*, he; *i*, *si*, she; *sinn*, we; *sibh*, you; *iad*, *siad*, they. The relative pronouns are: *a*, who, which; *an*, whose, and to whom; *na*, that which; *nach*, who not. The possessives are: *mo*, my; *do*, thy; *a*, his, her; *ar*, our; *bhur*, *ur*, your; *anjam*, their. The interrogatives are: *co*, who; *cia*, which; *ciod*, what. The indefinite pronouns are: *cach*, the rest; *cuid*, some; *eile*, other. Among the verbs are: *phaisg mi*, I wrapped; *phaisg thu*, *phaisg e*, &c.; negatively, *do phaisg mi*, &c. *Abair*, to say; *thubhairt mi*, I have said; *air radh*, said; *ag radh*, saying. Verb to be: *ta mi*, I am; *ta thu*, thou art; *ta e*, he is; *ta sinn*, we are, &c.; *an bheil mi*, am I; *cha'n eil mi*, I am not, &c. Among the prepositions are: *a*, *as*, of; *ag*, at; *air*, on; *an*, in; *bhàrr*, off; *car*, during; *do*, to, of; *eadar*, between; *gu*, till; *mar*, as, like; *o*, from; *ré*, during; *re*, *ri*, *ria*, to; *trid*, through, &c. The language is very guttural, and its euphonic methods peculiar. The following is a specimen from Ossian:

FIONNGHAL. DUAN I.
FINGAL. BOOK I.

Shuidh Cuchullin aig balla Thùra,
Sat Cuchullin by (the) wall (of) Thura,
Fo dhùbhra craoibh dhuille na fuaim;
In (the) shade (of a) tree foliage whose sounded;
Dh'aom a shleagh ri carraig nan còs,
Leaned his spear against rock (crag) of caves,
A sgaith mhòr r'a thaobh air an fheur.
His shield huge by his side on the grass.

—The principal work in Gaelic is the poems of Ossian in the original, translated into English by Macpherson, and into Latin by R. Macfarlan (3 vols., London, 1807). There are also other lyric and epic poems, military and funeral songs of the bards; the best being of the times just before and after the Christian era. There are Gaelic and English dictionaries by William Shaw (London, 1780), P. Macfarlane (Edinburgh, 1815), R. A. Armstrong (London, 1825), the highland society (Edinburgh, 1828), Norman McLeod and Daniel Dewar (London, 1845). Some of these have grammars with them.

ERSKINE, EBENEZER, a Scotch theologian, founder of the Secession church of Scotland, born June 22, 1680, died in Stirling, June 22, 1756. The son of a Presbyterian divine, he was educated at the university of Edinburgh, licensed to preach in 1702, became pastor the next year in Portmoak, and held that post 28 years. Here and at Stirling, where he lived from 1731 until his death, he was a great favorite with his parishioners, as well as with the church throughout Scotland. The dissensions in the church of Scotland began in 1720, when the book entitled the "Marrow of Modern Divinity" was thought to reveal latitudinarian tendencies dangerous to the prevalent doctrines. Refusing to take the abjuration oath, and opposing the reimposition of lay patronages, as contrary to the act of union and to the liberties of the Scottish church, and at the same time being one of the most influential defenders of what were termed the "Marrow" doctrines, Mr. Erskine was proclaimed in many polemical pamphlets an innovator in religion and a troubler in Israel, was censured by the synod, and in 1733 was solemnly rebuked and admonished at the bar of the general assembly. Against this decision, he with 3 other clergymen entered a protest; and as they continued the conduct for which they had been censured, they were suspended from their functions. This sentence was soon after removed, but the deposed brethren had meantime formed themselves into a separate consistory and received numerous accessions. Erskine continued to preach to large congregations at Stirling till his death.

ERSKINE, THOMAS, baron, a British jurist and statesman, the 3d son of Henry David, 10th earl of Buchan, born in Edinburgh, Jan. 21, 1750, died at Almondell, near Edinburgh, Nov. 17, 1823. Having studied at the high school of Edinburgh and attended for a while the classes of mathematics and natural philosophy at the university of St. Andrew's, though he was never matriculated at that institution, he gratified his

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predilection for naval life by entering the service as midshipman. Disappointed in his hope of promotion, he quitted the navy for a commission in the army. In 1770, soon after his marriage, he went with his regiment to Minorca, where he remained 2 years. Returning then to London, he became known in society as a young officer of extraordinary conversational powers. After 6 years of military service, during most of which time he was stationed in English country towns, he was induced to turn his thoughts to the law; his mother, a woman of great gifts of mind, approved his inclination, and in 1777 he entered himself a fellow commoner of Trinity college, Cambridge, merely to obtain a degree which would shorten his passage to the bar, at the same time becoming a student at law of Lincoln's inn. In order to master the technical part of his profession, he performed the laborious duties of clerk in the office of an eminent pleader, but a ludicrous parody of Gray's "Bard" which he published in the "Monthly Magazine" proves that he found time to indulge his wit and fancy. Many of his evenings were passed in a debating association, where, after the example of Pitt and Burke, he trained his talents to that surpassing strength which afterward gained him the reputation of the first of English advocates. He also at this time studied a few of the greatest models of oratory till he almost knew them by heart. He was called to the bar in 1778, and at once secured a rapid success by his brilliant defence of Captain Baillie, prosecuted for libel on Lord Sandwich. In a strain of vehement invective against the earl, he was interrupted by the judge, who told him that Lord Sandwich was not formally before the court. "I know that he is not," replied the undaunted advocate, "but for that very reason I will bring him before the court." In 1779, Mr. Erskine appeared at the bar of the house of commons as counsel for a bookseller against the monopoly of the two universities in printing almanacs. The prime minister, Lord North, had introduced a bill to renew this monopoly, and though opposition to it was considered a desperate attempt, the measure was triumphantly rejected, many friends of the ministry affirming that after Mr. Erskine's speech they could not conscientiously do otherwise than vote against it. In 1781 he gained another great triumph in securing the acquittal of Lord George Gordon, impeached for treason as the head of the "no popery" rioters. His speech was as remarkable for argument as for eloquence, and was applauded by Dr. Johnson as having prevented the precedent of hanging a man for constructive treason. He received in 1783, at the suggestion of the venerable Lord Mansfield, a silk gown and the patent of precedence at the bar, and the same year was returned to parliament as member for Portsmouth. He was a supporter of Fox, and advocated that minister's famous East India bill; but his parliamentary speeches, though they have probably been underrated, disappointed the high expectations of his friends, and are not comparable to his splendid pleas at the bar. With an enthusiasm for popular liberty, his best efforts were those in defence of the freedom of the press and the privileges of juries, and against the doctrine of constructive treason. In his defence of the dean of St. Asaph, charged with libel, he indignantly argued against the judge who refused to receive from the jury the verdict of "Guilty of publishing only." One of the most important of his speeches, and perhaps the first in oratorical talent, was that delivered in 1789 on the trial of Stockdale, who was arraigned for publishing a libel against the house of commons. Mr. Burke's articles of impeachment against Warren Hastings had been printed and sold throughout the kingdom before the commencement of the trial, and their masterly invective produced a deep and general impression upon the public mind against Mr. Hastings. To neutralize or repel this effect, a pamphlet was written, which Stockdale published, containing severe reflections upon the conduct of the managers of the impeachment. The pamphlet was deemed libellous; and in opposition to the sentiments of a whole people, and to the most mighty combination of talent that ever led a prosecution, amid what he himself describes as the "blaze of passion and of prejudice," Mr. Erskine undertook the defence of Stockdale, and established his reputation as the most consummate advocate of the age. Combining the utmost precision with the highest oratorical and rhetorical efforts, he rescued his client from the punishment which a nation seemed determined to award him. The doctrine expounded in his plea and sanctioned by the verdict became the foundation of the liberty of the press in England. In 1792 he acted as counsel to Thomas Paine, prosecuted as author of the "Rights of Man," and was therefor deprived of the office of attorney-general to the prince of Wales, which he had held for several years. Mr. Erskine was for 25 years engaged upon the most important cases in England, but his most arduous efforts were in 1794, when he gave the death-blow to the doctrine of constructive treason. Hardy, Horne Tooke, Thelwall, and several other persons, were arrested and committed to the tower on charge of political conspiracy and high treason. The trial of Hardy began Oct. 29, and the popular interest was such that a dense mob pressed around the court and made it almost impossible for the judges to proceed to and from their carriages. The indictment stated 9 overt acts of high treason, but the trial turned almost solely on the question of treasonable intention. The proceedings continued to the 8th day, and the whole force of the bar was marshalled against the prisoner and his undaunted defender; but the ability and eloquence of Erskine gained a verdict of acquittal, and forced the highest admiration even from his opponents. Mr. Tooke was arraigned Nov. 10, and pronounced not guilty Nov. 20; his acquittal was followed by that

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of Mr. Thelwall; and the government, in despair of convicting any of the supposed traitors, abandoned the other indictments. Mr. Erskine looked with favor upon the attempt at social renovation in France, and throughout the discussions upon French affairs at this period he opposed the interference of England on behalf of the Bourbons. His pamphlet entitled "A View of the Causes and Consequences of the War with France" rapidly passed through 48 editions. After the peace of Amiens he visited Paris, and was presented to Napoleon, who however passed him with the dry remark, *Vous êtes légiste?* Upon the death of Pitt in 1806, and the formation of Lord Grenville's coalition ministry, Mr. Erskine was appointed lord high chancellor, and created a peer under the title of Baron Erskine of Restormel castle. This ministry was, however, dissolved within a year, and he resigned his office before having had occasion to display all his ability in it. He passed the remainder of his life in retirement and comparative indigence, and unhappily a second time married. In 1815 he received the order of the thistle, and he took part for the last time in the house of lords in 1820 on occasion of the trial of Queen Caroline. Lord Erskine was doubtless the greatest of English advocates, and his eloquence may be compared without disadvantage to that of orators as illustrious as Pitt, Fox, Burke, and Sheridan. With an animated countenance, polished manners, great vivacity of mind, an easily modulated voice, and a character that seemed always young, he could lend himself admirably to every variety of sentiment. His sympathetic disposition made him always seek a look of applause in his listeners, and he once stopped in the midst of a harangue, whispering to a friend that he could not go on unless that "wet blanket of a face" opposite to him were removed. However completely absorbed in philosophical discussion or in the intricacies of a case, he was always alive to the emotions expressed in the faces of the jury, which he made the guide of his oratory. He has the honor of having presented to parliament the bill for the abolition of the slave trade, of having pleaded the cause of the Irish Catholics, supported propositions for the reform of the penal laws, and spoken and written in behalf of the struggling Greeks. His noblest efforts were in behalf of constitutional freedom, and during the momentous struggles of the period in which he lived there was no public man who had greater personal influence. There was a little of vanity in his character, and he often conversed with Dr. Parr, who was remarkably conceited, when most elaborate compliments were paid by each to the other. Dr. Parr on one of these occasions promised that he would write Erskine's epitaph; to which the other replied that "such an intention on the doctor's part was almost a temptation to commit suicide." He wrote a political romance entitled "Armatas, a Fragment" (published anonymously, 8vo., 2 parts, London, 1817), and a few political treatises; but the chief foundation of his fame is his numerous speeches, which retain in print the brilliancy of thought, copiousness of imagery, elegance of diction, and much of the fervor which rendered them so successful when delivered. A collection of his speeches at the bar connected with the liberty of the press, and against constructive treason, by James Ridgeway, appeared in London in 1810–'11 (4 vols. 8vo.), followed in 1812 by a collection of his speeches at the bar on miscellaneous subjects, and in 1847 by his speeches at the bar and in parliament, with a memoir by Lord Brougham (4 vols. 8vo.).

ERWIN OF STEINBACH, the principal architect of the cathedral of Strasbourg, born at Steinbach, near Bühl, in Baden, died Jan. 17, 1318. The principal tower of the cathedral had been completed in the 7th century under the reign of Dagobert. It was partly built of wood, and was reduced to ruins by lightning and successive fires. The nave, commenced in 1015, was only completed in 1275. Erwin was then requested to furnish designs for the decoration of the interior of the church, and for the construction of two new towers and a façade upon the site of the ruins of the old tower. The work was commenced Feb. 20, 1276, and the foundation stone of the new structure was laid May 25, 1277. The architect died when the work was only half finished; it was continued by his son Johannes (died March 18, 1339), and was subsequently continued chiefly after his designs, which are still preserved at Strasbourg. His daughter Sabina assisted him in the decoration of the interior of the church; and another of his sons, Winhing (died in 1330), was also an architect of some distinction. The remains of this family of architects are interred within the cathedral.

ERYMANTHUS, in ancient geography, a river and mountain of Arcadia, in Greece. The river, according to some the modern Dimitzana, rises on the frontiers of Arcadia and Elis, and flows into the Alpheus. The mountain, situated to the east of the river, formed the western point of the northern barrier of Arcadia, and was covered with forests. It was in this mountain that Hercules chased and killed the famous wild boar.

ERYSIPELAS (Gr. *ερυω*, to draw, and *πελας*, neighboring, from its tendency to draw in the neighboring parts), ST. ANTHONY'S FIRE, or in Scotland, ROSE, an inflammation of the skin characterized by redness, swelling, and burning pain, commonly spreading from a central point, and sometimes affecting the subcutaneous cellular tissue. Idiopathic erysipelas almost invariably attacks the face; frequently it is preceded by loss of appetite, languor, headache, chilliness, and frequency of pulse; a spot now makes its appearance, commonly on one side of the nose, of a deep red color, swollen, firm, and shining, and is the seat of a burning, tingling pain. The disease gradually extends, often until the whole of the face and hairy scalp have been affected, but it is exceedingly rare

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for it to pass upon the trunk. Often, while still advancing in one direction, the part originally affected is restored to its normal condition. Commonly large irregular vesicles (*phlyctenæ*) filled with serum, precisely similar to those produced by a scald, make their appearance on the inflamed skin. The pulse is frequent, there is total loss of appetite, headache, prostration, restlessness, and sleeplessness, and commonly, particularly at night, more or less delirium is present. The complaint runs its course in about a week, and the general symptoms ordinarily abate somewhat before any decline is noticed in the local inflammation. In itself erysipelas of the face is ordinarily unattended with danger; but where it occurs in the course of other and exhausting diseases, it adds much to the gravity of the prognosis. In fatal cases the delirium is apt gradually to lapse into coma. Erysipelas is subject to epidemic influences; in certain seasons it is exceedingly prevalent, while in others it is rarely seen. The attack is favored by overcrowding and deficient ventilation. Hospitals, particularly in the spring of the year, are infested with it. The writer recollects a crowded ward in the basement of Bellevue hospital (New York), in which for several weeks every patient that was placed in it underwent an attack of erysipelas, and many were affected a second time. Certain unhealthy states of the system predispose strongly to the disease, and an unwholesome diet and the abuse of alcoholic stimulants are commonly cited among its causes. We have seen that simple erysipelas is rarely fatal; consequently recoveries are common under a great variety of treatment. Usually it requires nothing more than to move the bowels by a mild laxative, and afterward to support the system by the administration of nutriment, and if necessary the use of quinine and wine whey. Where there is great prostration, stimulants may be freely administered; lately it has been proposed to treat all cases by the administration of the tincture of the muriate of iron in doses of from 10 to 20 drops every 2 hours, and this method has been found eminently successful. A great variety of external applications have at different times been recommended—the use of blisters applied to the centre of the inflamed part, of an epithem of mercurial ointment, the application of nitrate of silver and of tincture of iodine, &c. A simple wash of lead and opium, applied by means of linen cloths saturated with it, is commonly grateful to the patient, and answers every purpose. Systematic writers make a separate variety of the erysipelas of new-born children; it presents no peculiarity, however, except its greater gravity, in common with other diseases, in such delicate organisms. When erysipelas of the abdomen occurs in new-born children, it commonly has its point of origin in the recently divided umbilical cord. In some cases erysipelas, arising generally from some injury or excoriation, shows a tendency to advance in one direction while it passes away in another (*erysipelas ambulans*); in this manner it may pass in turn over almost every part of the surface.—In phlegmonous erysipelas the precursory symptoms are more constant and severe, the pain more violent, the prostration greater; the redness is most strongly marked along the trunks of the lymphatic vessels, and the lymphatic glands are swollen; the swelling of the skin is more considerable, it soon assumes a pasty consistence, and pits strongly on pressure. As the disease advances, the pain subsides, the redness is diminished, and fluctuation becomes evident; if left to itself, the skin, gradually thinned and distended, sloughs over a larger or smaller space, and pus mingled with shreds of dead cellular tissue is discharged. The disease indeed seems often to be in the cellular tissue rather than in the skin, and sometimes the cellular tissue throughout a limb appears to be affected. It is a disease of great severity, and when extensive often proves fatal under the best treatment. In its treatment, the same general principles apply as in simple erysipelas. The patient's strength should be supported by a nutritious diet, and tonics and stimulants must often be freely administered. The muriated tincture of iron may here also be resorted to with great advantage. Early in the disease the skin should be freely divided down into the cellular tissue, to relieve the constriction of the parts and afford an early opening to the discharges.

ERYTHEMA (Gr. *ερυθαινω*, to redden), an affection of the skin characterized by a slight redness without determinate form. It is generally due to the action of some special cause, as the heat of the sun, &c. Where it is produced by the friction of two contiguous surfaces, as frequently occurs in infants and in fleshy persons, it is often called *intertrigo*. *Erythema nodosum*, the severest form of the disease, is characterized by the eruption of numerous red spots from ¼ of an inch to an inch in their longest (vertical) diameter. These spots are slightly elevated; after a few days their color deepens, and passing through various shades of blue and yellow, the skin resumes its normal color. The affection is apt to be attended with fever, depression of strength, and derangement of the digestive organs. Simple erythema needs no treatment beyond the employment of soothing applications; in intertrigo, the use of an absorbent powder, as lycopodium, starch, &c., may be advisable. Erythema nodosum is best treated by diet, rest, and a mild laxative; in some cases tonics and iron may be used with advantage.

ERYTHRÆ, an Ionian city of Asia Minor, on the sea-coast at the extremity of a small peninsula. It had a fine harbor, in front of which were 4 small isles, called Hippi, and it was a scheme of Alexander the Great to isolate it together with the adjacent mountain of Mimas from the mainland by means of a canal. It was famed for its sibyl or prophetic woman. Its site is occupied by the modern village of Ritri, where there are many ruins of the old city.

ERYTHRÆAN SEA (Gr. *ερυθρος*, *ερυθραιος*,

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red, ruddy), in ancient geography, originally the name of the whole expanse of sea between Africa on the S. W., Arabia on the N. W., Gedrosia on the N., and India on the N.E., including the two great gulfs, the Arabian and the Persian. In this wider sense the term seems to have been used by Herodotus, who designates by it both the Indian ocean, of the shape of which he was ignorant, and the Persian gulf, distinguishing however the Red sea, the *yam suf* or weedy sea of the Hebrews, which he calls the Arabian gulf. The term ἡ νοτιη θαλασσα (southern sea) appears in some passages of the same historian as identical with the Erythræan, in others as designating the more distant and less known region of the latter. Later and better informed geographers, distinguishing the separate parts of the sea, applied to its main body the name of Indian ocean, and to its great gulfs the names of Persian and Arabian, while the term Erythræan sea (Lat. *Mare Rubrum*) was variously used by different writers until it became confined to the Arabian gulf. The origin of the name is doubtful; it is, however, probable that it is derived from the Phœnicians (or red race; Gr. φοινιξ and φοινικος, red), who, according to Herodotus in the opening of his work, "formerly dwelt on the shores of the Erythræan sea, whence they migrated to the Mediterranean," a statement confirmed by the critical researches of Rawlinson and others.

ERYX, an ancient town of Sicily, occupying the side of a mountain of the same name (now Monte S. Giuliano), on the N. W. coast of the island, near the promontory of Drepanum. Above it was a temple of Venus on the summit of the mountain. It early became a dependency of Carthage, was for a short time under the sway of Syracuse, was captured by Pyrrhus in 278 B. C., again reverted to the Carthaginians, and in the 1st Punic war was partially destroyed by Hamilcar, who converted it into a fortified camp, removing the inhabitants to Drepanum. A few years later it was taken by the Romans, but the city was subsequently surprised by Hamilcar Barca, and made his head-quarters till the conclusion of the war, while the Romans continued to hold the temple as an impregnable fortress. The site of the ancient city is now occupied only by a convent, and that of the temple by a Saracenic castle, now a prison, surrounded by the town of San Giuliano.

ERZBERG (Ger., ore mountain), a mining district in the circle of Bruck, Styria, so called from a mountain of the same name which for upward of 1,000 years has yielded vast quantities of iron. About 300,000 cwt. of ore of the best quality are annually extracted from these mines, and indeed the mountain might almost be called a solid block of carbonate of iron. In 1823 a colossal iron cross, 25 feet in height, was erected on its summit by the archduke John.

ERZGEBIRGE (Ger., ore mountains), a range of mountains on the boundary between Bohemia and Saxony, and in its southern portion lying chiefly in Bohemia. It extends E. N. E., W. S. W., about 100 m., and covers an average breadth of about 30 m. At its western extremity it connects with the range called the Fichtelgebirge, whose the White Elster has its source. The river Elbe defines its E. extremity, flowing toward the N. through the valley that separates the Erzgebirge from the Winterberg. On the N. the range slopes gently toward the plains of Germany, but on the S. the descent is more precipitous, with deep and narrow valleys running down to the valley of the river Eger, which flows E. to the Elbe. The highest elevations are W. of the central part of the range. Here are the summits of Keilberg, 4,212 feet above the sea; Fichtelberg, 3,968; Schwarzwald, 3,988; and Auersberg, 3,248. These are granitic peaks, but toward the Elbe, where the granitic rocks give place to sandstone, the elevation declines to a maximum of 1,824 feet. The range is traversed by 6 great roads, the most important of them connecting Prague with Dresden and Chemnitz. The valley of the Elbe admits the passage of the range by the railroad which runs from Dresden to Vienna. The Erzgebirge have long been famous for their mineral productions. Of these the most important are silver and tin, the annual product of the former metal amounting to about 720,000 oz., and of the latter, from the mines of Saxony, to about 140 tons. Crude cobalt, called zaffre, is produced in Saxony to the amount of 400 tons, and in Bohemia 200 tons. Lead is obtained to the amount of 400 or 500 tons, iron from 3,500 to 4,000 tons, and copper about 30 tons. Other mineral products are gold, found in small quantity, mercury, arsenic, bismuth antimony, zinc, manganese, and sulphur. Coal is found in the lower country near Dresden and Zwickau, and porcelain clay at Aue, 12 m. S. E. from Zwickau. This is used at the royal manufactory at Meissen.

ERZROUM, a province or eyalet of Asiatic Turkey, comprising the greater part of Turkish Armenia, and bounded N. by Trebizond, E. by Persia and the Russian dominions, S. by Koordistan, and W. by Seevas; pop. differently estimated at 110,000 and 600,000. It consists mainly of lofty table-land, the elevation of which is estimated at 6,000 feet, traversed E. and W. by several ranges of mountains, between which lie rich and extensive valleys. Cultivation is here well attended to, and the soil produces a profusion of excellent fruits, rye, barley, and flax, and furnishes pasturage for large herds of cattle. The climate in winter and spring is severe, and in summer the heat is excessive. The rivers Euphrates, Aras, Koor, and Tchoruk have their sources here. The mountains are inhabited mainly by Koords, who acknowledge at most a nominal allegiance to the sultan. —ERZROUM, the capital of the above province, and the principal city of Armenia, is situated on the Kara-su or W. branch of the Euphrates, in a beautiful plain about 6,000 feet above the level of the sea, 30 m. long and 20 m. broad; distance from its nearest seaport, Tre-

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bizond, 120 m.; pop. in 1854, 40,000. A triple wall of stone which nearly surrounds the old part of the town, and a large massive citadel, encompassed by a double wall, and having 4 stout gates covered with plates of iron, are its principal defences. The citadel, however, is commanded by a hill in the neighborhood. The streets are narrow and filthy; the houses are mostly of wood, mud, or bricks dried in the sun; and the whole city is infested with savage-looking dogs. The principal buildings are the Greek and Armenian churches, and the custom house, beside which there are about 40 mosques and numerous caravanserais. Outside of the city are 4 suburbs. The caravans travelling from Teheran to Mecca usually halt here, and an active trade is carried on with all the adjacent countries. Shawls, silk, cotton, rice, indigo, tobacco, and madder are imported from the east, and broadcloth, chintz, cutlery, &c., from the west by the Black sea. The exports are furs, gall, and live stock. Erzroum was built by the emperor Theodosius II. about A. D. 415, and named Theodosiopolis in honor of its founder. It was twice destroyed by fire and pillage, and in 1829 was taken by the Russians. Its present name is supposed to be a corruption of *Ardzroum*, the land of Rome, the Turks frequently applying the word Roum (or Rome) to any territory anciently recognized as a part of the Roman or Byzantine empire. Its position, which commands the road from Persia to Constantinople, renders it still an important military post, as it was in the time of its Byzantine masters, and also a point of great commercial interest. It is the seat of the Turkish governor-general, of the English and other foreign consuls, and the focus of the transit trade between Europe and Trebizond on the one hand and central Asia and Persia on the other. Several American missionaries reside here.

ESARHADDON, son and successor of Sennacherib, king of Assyria, reigned in the 1st half of the 7th century B. C. He is the Sarchedon of Tobit, the Asaradinus of the Canon of Ptolemy, and the Asshur-akh-iddina of the recently discovered Assyrian inscriptions. From the latter, compared with a few passages in the books of Kings (2, xix. 37), Isaiah (xxxvii. 38), Ezra (iv. 2), and Tobit (i. 21), the history of his reign may be summed up, according to George Rawlinson's "Essay on the History of Assyria," in vol. i. of his "Herodotus," as follows: He carried his arms over all Asia between the Persian gulf, the Armenian mountains, and the Mediterranean, made war on Egypt, conquered Sidon, Cilicia, the country of the Gimri or Sacæ, parts of Armenia, Media, Idumæa, and other countries. In Susiana he contended with the son of Merodach-Baladan; on another son, refugee at his court, he bestowed a territory on the coast of the Persian gulf. Esarhaddon appears to have held his court sometimes at Nineveh and sometimes at Babylon, to which latter city Manasseh, king of Judah, was led prisoner by his captains. He peopled Samaria by colonies drawn chiefly from Babylonia. His buildings equalled in magnificence those of his predecessors. One inscription speaks of 30 temples erected by him in Assyria and Mesopotamia, "shining with silver and gold, as splendid as the sun." One of these edifices is that known as the S. W. palace at Nimroud, which, as stated by Mr. Layard, "answers in its general plan, more than any building yet discovered, to the description in the Bible of the palace of Solomon." Another was erected at Nineveh, and called the palace "of the pleasures of all the year," "a palace such as the kings his fathers who went before him had never made." In the construction of his palaces he employed Syrian, Greek, and Phœnician artists, as well as workmen furnished him by princes of Syria and Cyprus. His works seem to indicate a long and prosperous reign. He was succeeded by his son Asshur-bani-pal, or, according to Oppert, by a Tiglath-Pileser.

ESCALADE (Fr., from Lat. *scala*, a ladder), in military affairs, an attack on a fortified place by scaling the walls with ladders, without the formalities of a siege, or raising regular works to protect the men.

ESCAMBIA, a W. co. of Florida, separated from Alabama on the W. by the Perdido river, bounded E. by the Escambia, and S. by the gulf of Mexico; area 1,110 sq. m.; pop. in 1850, 4,351, of whom 1,332 were slaves. It consists mostly of a level and not very productive country, covered with extensive pine forests. In 1850 it yielded 4,950 bushels of Indian corn, 4,150 of sweet potatoes, and 10,150 lbs. of rice. There were 6 churches and 2 newspaper offices in the county, and 269 pupils attending public schools. Named from Escambia river. Capital, Pensacola.

ESCARPMENT (It. *scarpa*, slope of a wall), in geology, a steep declivity or precipice. The term is most commonly employed in fortification, in which it designates any steep slope formed to oppose the progress of the enemy. In a fortress, the scarp is the exterior slope of the wall which supports the rampart.

ESCHEAT (law Fr. *escheat*, from *eschoir* or *échoir*, to fall out, or lapse), a failure in the regular descent of lands whereby the fee reverts back to the original grantor or his heirs if they can be found, and if not, then to the sovereign, who, according to the feudal tenure, was the original source of title. Such a failure may occur for the want of heirs, or of such heirs as can inherit the particular estate. This could but rarely happen as respects an absolute estate in fee, inasmuch as heirs may be sought to the remotest degree of collateral consanguinity on failure of lineal descendants; but it is not an unfrequent occurrence where the estate is limited, as in the case of a marriage settlement by which the estate is to descend to the issue of the marriage, or of an estate tail by which a limitation is made to the heirs of a man's body or other specified heirs. In these and analogous instances, upon the failure of the heirs designated, although

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there may be others capable of inheriting generally, the title to the land reverts to the grantor if no other provision has been made in the deed creating the estate. The escheat in such a case is said to be *propter defectum sanguinis*. It may also occur by an obstruction of the descent *propter delictum tenentis*, that is, when there has been a conviction of felony; in which case, according to the old phraseology, there was a corruption of blood, so that the man thus convicted was deemed in law to have no heirs. A distinction was made between treason and other felonies. In the former case forfeiture to the crown intervened and prevented the escheat of the lands to the original proprietor; in the latter, the lands of the felon were intercepted by the crown for a year and a day, and then escheated to the lord of the fee. By statute 54 George III., c. 145, no attainder for felony except treason and murder is now permitted to defeat the right of the heir or other person who would by law be entitled to the estate, except during the life of the offender. By the common law bastards were not deemed to have any heirs except of their own bodies, for being without lawful parentage, they can have no collateral kindred; therefore upon the death of a person of illegitimate birth, leaving no issue and without will, his lands escheated. So in the case of a man dying intestate leaving only alien relatives; as they could not inherit, his lands would escheat. Formerly it was held that there could be no descent even to natural-born subjects, between whom and the deceased there were lineal or collateral alien ancestors through whom they would be obliged to claim; but the statute 11 and 12 William III., c. 6, provides that an intermediate alien ancestor shall not impede the descent to one otherwise capable of inheriting.—The law of escheat in the United States varies from the English in several particulars. Thus for illustration, taking it as it exists in the state of New York, to which there is a general conformity in the other states, the ultimate property to lands is deemed to be in the people; and whenever in any private ownership there is a failure of descent by want of heirs, the property escheats to the people, or, as is more commonly said, to the state. The escheated lands are to be held, however, subject to all the trusts, encumbrances, &c., that they would have been had they descended; and authority is given to the courts of the state to direct a conveyance to the parties equitably entitled thereto. Conviction of any criminal offence except treason produces no forfeiture of lands or personal property; and where the punishment is imprisonment for life, the convict is deemed civilly dead, and his heirs take by immediate descent as they would upon his natural death. In the case of outlawry for treason, there is a forfeiture of lands to the state during the life of the offender. The lands of a person dying intestate who is illegitimate do not necessarily escheat, but descend to his mother if living, or if she is dead, to the relatives on the part of the mother. As estates tail do not exist in the United States, many of the questions which arise in England upon the failure of particular heirs do not occur here. Properly speaking, an escheat to any private individual is unknown to our law. Not only feudal incidents, but the theory upon which they were founded, have been abrogated. In respect to aliens, a statutory provision similar to what has been enacted in England, as above mentioned, removes all disability of inheriting by reason of an intervening alien ancestor. Where property is purchased by an alien, or has been otherwise acquired, as by claim of inheritance, there being no other heirs, although by operation of law it escheats to the state, yet is his title good until divested by some proceeding on the part of the state to enforce the escheat; that is to say, it is valid against all other claimants, and even against the state itself until judgment has been rendered by some court declaring the escheat.

ESCHENBACH, Wolfram von, a German minnesinger, belonging to the circle of poets which near the end of the 12th and the beginning of the 13th century frequented the court of the landgrave Hermann I. of Thuringia in the castle of Wartburg. He was of noble birth, received the honor of knighthood from the count of Henneberg (Poppo VII.), fought under the banner of different lords in the civil wars of the time, gained by his songs the hospitality of many noble dwellings, and made his longest abode at the court of Eisenach, in the mountain castle of Wartburg, where the landgrave Hermann collected the most illustrious minnesingers. Thither he went in 1204, was associated with Heinrich von Veldeck, Walther von der Vogelweide, and Heinrich von Ofterdingen, and engaged with the last in 1207 in the poetical contest known as "the war of the Wartburg," which was at length concluded by the magician Klingsor, and the legends of which were collected in a wonderful poem about a century later. Eschenbach afterward sang at other courts, and died between 1219 and 1225. Some of his poems are original, and others are imitations of troubadour songs and trouvère romances. They display depth of feeling and a mastery of language, and Frederic von Schlegel has even called Eschenbach the greatest poet that Germany has produced. The first critical edition of his works was by Lachmann (Berlin, 1833). They have been adapted into modern German by San Marte (Magdeburg, 1836–'41, 2d ed. 1858), and *Parcival* and *Titurel* by Simrock (Stuttgart, 1842; 2d ed., 1857).

ESCHENMAYER, Adolf Karl August von, a German philosopher, born at Neuenburg, in Würtemberg, July 4, 1768, died Nov. 17, 1852. From 1811 to 1836 he taught philosophy and medicine and afterward practical philosophy at the university of Tübingen. He produced a great variety of writings, chiefly on philosophy. His religious views are strongly tinged with mysticism, and several of his writings are directed against the theories of Hegel and against the "Life of Jesus" by Strauss. His principal work, *Religionsphilosophie*, appeared in Tübingen in 1818–'24 (3 vols. 8vo.).

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ESCHSCHOLTZ, JOHANN FRIEDRICH, a German naturalist, born at Dorpat, Nov. 1, 1793, died there, May 19, 1831. He accompanied Kotzebue's expedition of discovery (1815–'18) as physician and naturalist, and became on his return professor of medicine and director of the zoological museum of the university of Dorpat, to which he presented his mineralogical collection. He also joined Kotzebue's new expedition in 1823, published an account of it at London after his return (1826), and furnished a description of 2,400 species of animals to Kotzebue's *Neue Reise um die Welt* (Weimar and St. Petersburg, 1830). A zoological map of these animals was published by him in Berlin (1829–'33). Among his other most important works is his *System der Akalephen: eine ausführliche Beschreibung aller medusenartigen Strahlthiere* (Berlin, 1829).

ESCURIAL (Sp. *Escorial*), a palace and mausoleum of the kings of Spain, situated in Escorial de Abajo, a town of 2,000 inhabitants, in a barren region 2,970 feet above the sea, on the S. E. slope of the Sierra Guadarama, in New Castile, 25 m. N. W. from Madrid. The correct title of this celebrated palace is "El real sitio de San Lorenzo el real del Escorial," so called from having been built in fulfilment of a vow made by Philip II. that he would build the most magnificent monastery in the world, if St. Lawrence would give him victory over the French in the battle of St. Quentin, 1557. St. Lawrence suffered martyrdom by being broiled on a gridiron, and by a quaint conceit of the king or his architects, the ground plan is in the form of a gridiron, with handle and bars complete. Voltaire and other French writers have claimed for a Frenchman named Louis Foix the honor of having been the architect of the Escurial. It is, however, beyond doubt that Juan Bautista de Toledo commenced it from his own plans, and on his death, in 1567, it was continued by his pupil, Juan de Herrera. The foundation was commenced on St. Lawrence's day, April 23, 1563. Twenty-one years' labor and a sum equal to $15,000,000 were expended in completing the work. The body of the gridiron is represented by 17 ranges of buildings, crossing each other at right angles, forming a parallelogram enclosing 24 courts, with a square tower 200 feet in height flanking each of the 4 corners of the building, thus representing a gridiron reversed, the towers being the upturned feet. A wing 460 feet long represents the handle of the implement, and contains the royal apartments. The average height of the walls is 60 feet. The total length of the building is 740 feet N. and S., and 580 feet E. and W. It contains the royal palace, royal chapel, monastery with 200 cells, 2 colleges, 3 chapter houses, 3 libraries, 5 great halls, 6 dormitories, 3 hospital halls, 27 other halls, 9 refectories, 5 infirmaries, a countless number of apartments for attendants, 80 staircases, 1,110 windows looking outward and 1,578 inward, or, including outhouses, 4,000 windows in all, beside 14 gates and 86 fountains. The whole edifice is built of white stone spotted with gray, resembling granite, and quarried on the site. The Doric is the prevailing order of architecture. The most striking feature of the edifice is the church, built in general imitation of St. Peter's at Rome, in the form of a Greek cross with a cupola and two towers. It contains 40 chapels with their altars, and is 374 feet long, 230 broad, divided into 7 aisles, paved with black marble and roofed by the dome rising 330 feet from the floor. The grand altar, 90 feet high and 50 feet wide, is composed of jasper and gilded bronze. Eighteen pillars, each 18 feet high, of red and green jasper, support an estrade on which the altar is placed. Porphyry and marbles of the richest description incrust the walls, and on either side are statue portraits of the kings. Directly under the high altar, so that the host may be raised above the dead, is a mausoleum built by Philip IV., from a design after the Roman pantheon. This burial-place is 36 feet in diameter, with walls of jasper and black marble. Here the remains of all the sovereigns of Spain since Charles V. repose in niches one above another. Another burial-place in one of the chapels is called the pantheon of the infantas. Several fine paintings adorn the church, but it is much shorn of its embellishments since it was plundered by the French. Benvenuto Cellini's marble "Christ," presented to Philip by the duke of Tuscany, and brought from Barcelona on men's shoulders, is still shown here, and an immense collection of saintly relics amassed by the founder may also be seen. The interior of the church is a triumph of architectural effect, grand, massive, and solemn. On its steps are 6 colossal statues in granite, with marble heads and hands, and gilt crowns. These are called the kings of Judæa. The edifice forms one side of a court, facing a finely sculptured portal, which opens twice for every Spanish monarch, once when he is carried through it after his birth, and once after his death, when 3 nobles and 3 priests bear him to the tomb. The royal apartments contain little worthy of notice, excepting two picture galleries, from which, however, most of the *chefs d'œuvre* have been removed to Madrid. The arched room of the great library is 194 feet in length, 32 in width, and 36 in height. The ceilings were painted in fresco by Bartholomew Carducci. The library was said before the French invasion to have contained 80,000 printed and 4,300 MS. volumes, but we have no accurate estimate of its present contents. It is believed to contain between 4,000 and 5,000 MSS., of which 567 are Greek, 67 Hebrew, and 1,800 Arabic. The Arabic MSS. are not accessible to visitors. A portion of the library was destroyed by fire in 1671, and again in 1761. The general aspect of the Escurial is that of a freshly erected pile, rising from the midst of plantations, and more imposing from its magnitude than from grandeur of architecture. The E. and W. terraces overlook the slopes; the N.

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and W. sides front the mountain, and are connected with the village by a subterranean gallery tunnelled in 1770 as a means of communication during storms.

ESDRAS, Books of, two apocryphal books of the Old Testament, given as the 3d and 4th books of Ezra (the 2d being properly the book of Nehemiah), in several manuscripts of the Latin Vulgate, as well as in all printed editions anterior to the decree of the council of Trent, which declared the two additional books uncanonical. In the English authorized version of the Apocrypha they are called 1st and 2d Esdras; in the Clementine and Sixtine versions of the Vulgate they appear at the end of the volume, being inserted, as expressly stated, in order to "preserve from being altogether lost books which had been sometimes cited by some of the holy fathers." In all the manuscripts of the Septuagint, the first of these books, or the so called 3d of Ezra, precedes the canonical books of the Jewish scribe, which, in this version, include that of Nehemiah. It is a recapitulation of the history related in the canonical book of the same name, interspersed with some interpolations taken from 2 Chronicles, Nehemiah, and other sources. It is written in an elegant style, resembling that of Symmachus, though it appears to be rather a version than an original work. The name and age of the author or translator are unknown. The 2d Esdras or 4th of Ezra is of a different character from its apocryphal predecessor, and seems to owe its place among the uncanonical writings of the Old Testament only to the historical name which it bears. It contains a number of visions resembling those of the Apocalypse, related in a style acknowledged by prominent critics to rise occasionally to great sublimity of thought, energy of conception, and elegance of expression. This book also is supposed by some to be a translation, from the Hebrew or Chaldee. But both the original and the Greek translation mentioned by Clement of Alexandria having been lost, the book was believed to exist only in the old Latin version, until more recent discoveries enriched biblical literature with Arabic and Ethiopic translations. This book is ascribed to Ezra the scribe by Clement of Alexandria, and was regarded as prophetic by most of the fathers of the church, though it does not appear to have been known by Josephus. Jahn supposes the author to have been a Jew educated in Chaldea, and converted to Christianity, who flourished about the beginning of the 2d century of our era. Dr. Laurence maintains that the author was a Jew who lived shortly before the Christian era. He accordingly rejects, as interpolations, the first two chapters of the book, which furnish the chief argument for his acquaintance with the doctrines of Christianity. Dr. Lee believes the author to have been contemporary with the author of the book of Enoch, or rather to have written the latter work himself.

ESHER, a village and parish of Surrey, England, on the S. W. railway, 15 m. S. W. of London; pop. of parish (1851), 1,441. It is the seat of Claremont House, built by Lord Clive, afterward occupied by the princess Charlotte and Prince Leopold, and still later the residence of the ex-king Louis Philippe and his family. Esher place, one of Cardinal Wolsey's mansions, is also in this parish.

ESK, the name of several rivers of Scotland. I. A river of Dumfriesshire, formed by the junction of the Black and White Esk, runs a short distance along the English boundary, enters Cumberland, and falls into the Solway frith, after a course of 24 m. II. A river of Edinburghshire, formed 1½ m. N. of Dalkeith by the junction of the N. and S. Esk, flows N., and empties into the firth of Forth at Musselburgh. III. North Esk, a river of Forfarshire, rises among the Grampian hills, flows S. E., chiefly along the boundary between Forfarshire and Kincardineshire, and enters the German ocean near Montrose; length, 22 m. It has valuable salmon fisheries. IV. South Esk, a river of Forfarshire, rises in the Grampians, flows S. and S. E., and enters the German ocean near the mouth of the N. Esk. It forms a large basin at Montrose, but is navigable only a short distance from the sea. It has salmon fisheries.

ESMERALDAS, a province of Ecuador, in the department of Quito, lying about the mouth of the Esmeraldas river; area, 1,600 sq. m.; pop. estimated at 5,513. It is on the coast, and has several harbors, of which the most important is that of Esmeraldas, the capital of the province. Its soil is fertile, and produces abundantly cacao, tobacco, indigo, and many kinds of fruits. Its mountains are covered with valuable forests, and have unexplored mines; its rivers are rich in gold, and emeralds were formerly found in such abundance as to have given the name to the province.

ESNEH (the ancient *Latopolis* or *Lato*), a town of upper Egypt, on the left bank of the Nile, lat. 25° 30′ N., opposite Taud, and 28 m. S. S. W. of Thebes; pop. about 4,000. It is a dirty, poverty-stricken place, with mud houses, and was selected in 1834 as a place of banishment for the Ghawazee or dancing women of Cairo and other females who offend against the rules of the police. It is the emporium of the Abyssinian trade, contains manufactories of cotton goods, shawls, and pottery, and is a celebrated camel market. It was anciently a city of great size and importance, the remains of which are mostly buried under large mounds covering the adjacent country. In the centre of the modern town, however, surrounded by filthy hovels, stands the portico of a great temple, in a fine state of preservation. It is supported by 24 massive and elegant pillars, each 5½ feet in diameter and 40 feet high. The portico is 112 feet long, 53 feet broad, and covered with sculptures and hieroglyphics. On its ceiling is a zodiac, like that of Dendera; over the dedication at the entrance are the names of Tiberius Claudius Cæsar, Germanicus, and Vespasian, and within occur those of Trajan, Hadrian, and Antoninus. It is known

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to be a work of Roman times, and was finished in the reign of Vespasian. In 1843 Mehemet Ali had it cleared of the rubbish which filled the interior, and it is now used as a cotton warehouse.

ESPALIER (Fr., from Lat. *palus*, a pole), a kind of trellis-work used in horticulture, on which to arrange the branches of fruit trees, so as to train them into a horizontal direction, and to expose them to the light and heat of the sun. It is employed in the United States where it is desired to produce a great variety of fruits in small enclosures. The espalier is fastened to the walls or high fences of the garden, and dwarf pears and peaches are trained in this way. In England, apples, cherries, plums, and even gooseberries are thus trained, the espalier not being always fastened to the walls. In France and other parts of Europe the fastened espalier is principally used, and the peach and nectarine are raised on such frames. The espalier thus permanently secured possesses some advantages over the system of nailing the tree to the wall, which renders it more difficult to remove the insects that are apt to breed between the branches and the wall, and to wash and clean the trees. In American forcing houses, the peach is commonly trained on espaliers, so formed that the greatest amount of surface can be fairly exposed to the sun and air.—To train to espaliers, the fruit tree is selected when young, after the buds have made their first year's growth. The stem or trunk should be clean and straight. It is to be carefully planted in a properly prepared border, and headed down just before it begins to push out for growing. When the buds have pushed and grown 3 or 4 inches, it should receive a summer pruning. One shoot is trained perpendicularly, and the others are laid horizontally along the trellis bars, one or two each side of the stem, and about 9 inches apart. If the extremity of the leading shoot be pinched off, leaving about 15 inches, the summer-formed buds will push out in turn, and the lower ones upon it are to be trained out horizontally as they grow, at nearly equal distance apart. The extremities of these branches are to be shortened in again some time previous to the next spring's growth, and in midsummer the buds upon the leading shoots are to be all rubbed off, excepting the 3 uppermost; 2 of these are to be trained out horizontally, and the upper is to be the leader. By this repeated pruning and pinching, short stems are produced, and in due time the fruit-bearing buds will appear, which in the pear are of peculiar form, growing upon what are technically called fruit spurs, and in the peach and plum are distinguished by their fulness and roundness and other dissimilarities to leaf buds. Fan-training on espaliers is practised with the peach and nectarine especially, and sometimes with the apricot; this consists in training the branches so as to spread obliquely upward like the rays or sticks of a fan. With the pear and apple the horizontal mode is adopted. Many flowering shrubs can be trained upon espaliers and trellises by careful attention, and any requisite form combining beauty and utility can be secured for ornamental purposes. The object in fruit culture, however, is to secure an abundance of fruit buds in confined limits, while affording sufficiency of light and sunshine. For this purpose no other plan seems so feasible as the espalier; but since the dwarfing of the pear on the quince stock has been practised, standard trees of dwarf dimensions, which can be planted near each other, and can be trained like shrubs or bushes, are preferred.

ESPARTERO, Joaquin Baldomero, duke of Vittoria, a Spanish soldier and statesman, born Feb. 27, 1792, in Granatula, province of Ciudad Real. He is the son of a wheelwright, received some instruction in his native village and in the neighboring town of Almagro, enlisted in 1808 as a common soldier, subsequently attended the military school at Cadiz, was made sub-lieutenant in 1814, engaged in 1815 in the war in Venezuela, attained in South America to the rank of general, and in 1824 was sent to Madrid as a bearer of despatches for the government. He returned to South America the next year only to witness the triumph of Bolivar and to be thrown into prison, from which he escaped after a few months' detention. After his arrival in Spain he displayed a large fortune, derived, it was said, from gambling in South America. In 1827 he married the beautiful daughter of a wealthy gentleman of Logroño. He was one of the first to declare himself in favor of the measure brought forward to secure the succession to the throne to Isabel II., and the regency during her minority to her mother, Queen Christina; and on the breaking out of civil war after King Ferdinand's death (Sept. 29, 1833), he took a conspicuous part against the Carlists, became commander-in-chief of the province of Biscay (Jan. 1, 1834), and soon after field-marshal and lieutenant-general of the royal forces (June 20, 1835). Although not always successful against the Carlists, he displayed more spirit and ability than any of his colleagues; and having protected Madrid against the insurgents (Aug. 1836), he was appointed general-in-chief of the army of the north, viceroy of Navarre, and in the following month captain-general of the Basque provinces. Soon afterward he drove the Carlists from the position of Luchana, and, assisted by the British fleet, raised the siege of Bilbao (Dec. 24, 1836), on which occasion he was created count of Luchana. In the mean time revolution was rife in Madrid, resulting in the proclamation of a new constitution, June 18, 1837, to which Espartero, as a member of the constituent cortes, gave his adherence. He forced the army of Don Carlos, which had advanced to the walls of Madrid (Sept. 12, 1837), to retreat, and drove it back across the Ebro. On April 27, 1838, he defeated near Burgos the army of the Carlist general Negri, and soon afterward near Penacerrada that of Gen. Guergue: and after gaining new and important

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victories in May, 1839, he was created (June 1) a grandee of the first class with the title of duke of Vittoria and of Morella. Skilfully availing himself of the dissensions and calamities of the Carlists, and of his personal acquaintance with their general, Maroto (the successor of Guergue), who had been his companion in arms in South America, he succeeded in concluding a convention with him at Bergara (Aug. 29, 1839), by which 24 battalions of veteran Carlist troops acknowledged the supremacy of the queen. Don Carlos fled to France, the few troops that remained devoted to him were dispersed, and Cabrera himself, the most formidable Carlist leader after the death of Zumalacarreguy (1835), was at length overpowered by Espartero, and compelled to follow his master to France (July 6, 1840); and thus the war with the Carlists was at an end. But the strife of political parties, in which Espartero now took a more prominent part, continued to distract the country. A law interfering with the freedom of speech in the *ayuntamientos* or town councils, passed by the government and opposed by Espartero, became the signal for an insurrection. Espartero made a triumphant entry into Madrid and Valencia, whither he had been summoned by Christina, who proposed to place him at the head of a new administration. But in the course of a stormy interview with him, the queen suddenly determined to resign her office of regent (Oct. 10, 1840), and retired to France. Espartero became the chief of the government, and was confirmed in his position by a decision of the cortes (May 8, 1841), by which he was appointed regent of Spain during the remainder of the minority of Isabel. He resisted the encroachments of the holy see as well as those of the extreme republican party, quelled an insurrection in favor of Christina under O'Donnell, at Pamplona, defeated the attempts of Concha and Diego Leon to seize the young queen and to bribe the army, repressed the unruly spirit of the people in the Basque provinces, and, on Nov. 18, 1841, subdued Barcelona, the focus of the revolutionary politicians and the discontented industrial population. But within a year the country was again in open rebellion. A new and bloody conflict broke out at Barcelona. Espartero took the town (Dec. 1842) after a heavy bombardment. Violent outbreaks took place in many of the provinces. His refusal to grant an amnesty to political offenders who were partisans of Christina, and to dismiss some of his officers who had taken a conspicuous part in reducing the Barcelona insurgents, sealed the fate of his administration. His cabinet resigned. Revolution, promoted by the agents of Christina and supported by Concha, O'Donnell, and Narvaez, spread over the land. The junta of Barcelona declared the majority of Isabel (June 13, 1843), and deposed Espartero. Narvaez, putting himself at the head of the insurgents at Valencia, entered Madrid, July 22; and Espartero, deserted by all parties, was received on board an English ship of war in the bay of Cadiz, July 30, whence he soon afterward set sail for England, arriving at Falmouth Aug. 19. He resided in London until Dec. 29, 1847, when he was recalled to Spain and created a senator. He took his seat in the senate, Jan. 13, 1848, but soon retired to Logroño, and took no part in the government until July 17, 1854, when an insurrection broke out, which again drove Christina and Narvaez from the country and replaced Espartero at the head of the government. His administration was marked by violent debates in the cortes on the political institutions of Spain, by the agitation of the question of the estates of the clergy, by a severe financial crisis, and by various other difficulties at home, while the Crimean war created some embarrassment in foreign relations. With a view of consolidating his government, he had appointed O'Donnell, the principal leader of Christina's party, minister of war, but this coalition could not last, and Espartero resigned in July, 1856. His resignation was followed by outbreaks in Madrid and other towns, in which Espartero, however, who has since lived in retirement, did not take any part.

ESPINASSE, Esprit Charles Marie, a French general, born at Saissac, Aude, April 2, 1815, killed at Magenta, June 4, 1859. He served in early life in Algeria, assisted in the *coup d'état* of Dec. 2, 1851, and became an aide-de-camp of Napoleon III. In the Russo-Turkish war he was at first unsuccessful in an expedition in the Dobrodja (1854), where he and his troops were prostrated by the cholera; but he distinguished himself in 1855 during the battle of the Tchernaya and the storming of the Malakoff, and was appointed general of division. His devotion to Napoleon and his uncompromising energy of character caused him to be made minister of the interior and of public safety, Feb. 8, 1858, Orsini's attempt upon the emperor's life being made a pretext for investing a soldier with the functions of a civilian. But dictatorial and unpolished, he could not maintain himself in his office. M. Delanglo became his successor (June 14, 1858), while the general received a seat in the senate. He was among the first to join the army in Italy, and fell early in the battle of Magenta.

ESPINASSE, Mlle. de l'. See Lespinasse.

ESPINEL, Vicente, a Spanish poet, born in Ronda, Andalusia, about 1540, died in Madrid about 1630. His father's name was Francisco Goma, but, according to a prevailing custom among the ancient Granadan nobility, he adopted the name of his maternal grandmother. The incidents of his life, like the dates of his birth and death, are surrounded with obscurity, but it is certain that he was educated at Salamanca, and that he led an adventurous life in various parts of Europe. In the latter part of his life he held an ecclesiastical office in his native town, though he passed much of his time in the capital. He was through the whole of his career more or less in pecuniary trouble,

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and died in great poverty, although he was the recipient of a pension from the archbishop of Toledo. His restless and sarcastic disposition contributed not a little to aggravate his difficulties, and alienated from him Cervantes and others of his friends. He was prominent among the Spanish poets of the 16th and 17th centuries, and the first poetical productions of Lope de Vega were submitted to his criticism. Some of his *canciones*, *redondillas*, pastorals, and elegies are spirited, picturesque, and harmonious in versification. He was also proficient in music, composed the music for the funeral service on occasion of the death of Philip II., and is said to have added a 5th string to the guitar, which soon led to the invention of the 6th. But his chief work is his sprightly, amusing, and characteristic "Life of Marcos de Obregon" (*Relaciones de la vida del escudero Marcos de Obregon*), which first appeared at Barcelona in 1618, and has since passed through several editions in Spain, of which that of Madrid, 1804, is the last. An English translation was made by Algernon Langton (London, 1816). Tieck wrote an imitation in German. Voltaire accused Le Sage, who was no favorite with the sage of Ferney, of plagiarism in connection with this work, and denounced the "Gil Blas" as taken entirely from Espinel's "Marcos de Obregon."

ESPIRITO SANTO, a maritime province of Brazil, bounded N. by the province of Bahia, S. by Rio Janeiro, W. by Minas Geraes, and E. by the Atlantic; area, 23,000 sq. m.; pop. according to government returns published in 1856, 51,300, about ¼ being slaves; capital, Vittoria. It has a healthy climate and a rich but ill cultivated soil, watered by numerous rivers which rise among the Cordilleras and flow into the Atlantic. Canoes ascend these streams nearly to their sources, and coasting vessels, carrying on an export trade in rum, unrefined sugar, mandioca, flour, rice, maize, cotton, timber, dyestuffs, drugs, and salt fish, frequent the deep and safe harbors formed at their mouths. Along the coast are the islands called the Abrolhos. Opposite to them, on the river Caravellas, is the town of Caravellas, the most commercial town of the province, and containing a German colony. The interior, covered with mountains and dense forests, is peopled almost wholly by Indians. Among these are the Botocudos, noted for their bravery and cannibalism.

ESPRONCEDA, José de, a Spanish poet, born at Almendralejo, Estremadura, in 1808, died May 23, 1842. The liberal political sentiments of his early effusions caused him to be sent for some time into exile. While in France, he took part in the revolution of 1830. Under the administration of Espartero he received a diplomatic appointment at the Hague (1840). He devoted much attention to Byron's works, which he endeavored to imitate. His best poem, though unfinished, is his *El Diablo Mundo*, and his best novel is his *Don Sancho Saldaña*. An edition of his works without the *Diablo Mundo* was published in Madrid in 1840, and one including it in Paris in 1856.

ESQUIMAUX, a name given to a race who are the sole inhabitants of the shores of all the seas, bays, inlets, and islands of America N. of lat. 60° N., from the E. coast of Greenland to Behring's straits. Their habitations stretch along the Atlantic on the coast of Labrador to the straits of Belle Isle, and they are found on the Pacific as far as the peninsula of Aliaska, and even to some extent on the opposite coast of Asia. The entire length of coast under their control is computed at not less than 5,400 miles exclusive of inlets, and the language spoken throughout this great range is intrinsically the same. The name of Esquimaux is derived, according to Charlevoix, from the Algonquin word *Eskimantick*, which signifies "eaters of raw fish." Sir John Richardson, however, thinks it is of Canadian origin, and derived from the phrase *Ceux qui miaux* (*miaulent*), "Those who mew," referring to their peculiar shout as they surround trading vessels in their boats. He adds that the word is unknown to the Esquimaux, who invariably call themselves *Inu-it*, "the people." Crantz describes the Greenlanders, between whom and the other tribes of Esquimaux there are few points of difference, as a small but well proportioned, broad-shouldered people, generally less than 5 feet in height, with high cheek bones, flat faces, small lustreless black eyes, round cheeks, small but not flat noses, small round mouths, long, straight, coal-black hair, large heads and limbs, and small soft hands and feet. They root out the beard, and are inclined to corpulency. Their body is of a dark gray color, but the face brown or blue. This brown color seems not altogether natural, because their children are born as white as others, but is due in part to their habits; for they are constantly handling grease, and seldom wash themselves. Lesson describes them as superstitious to excess, and possessed of those vague religious sentiments which pervade all the northern tribes. Polygamy is practised, and women are regarded as creatures of an inferior order, to be disposed of by the men according to their pleasure. Their dwellings are almost invariably built near the sea-shore, and are either permanent or temporary according to the situation and the materials at the disposal of the workman. In Greenland, where their permanent dwelling is built of stone cemented by turf as a substitute for mortar, it is usually not more than 6 or 8 feet high, and is covered by a flat roof of wood and turf. It has neither door nor chimney, and the floor is divided into compartments by skins attached to the posts that support the roof. Each family has a separate apartment, and each apartment a window of seal skin dried, which is white and transparent. Benches are used as seats during the day and as couches during the night, the bedding being composed of reindeer skins. In Gilbert sound the houses are made of wood, and

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at Regent's bay, according to Sir John Ross, the roof is arched, and the habitation sunk 3 feet in the ground, a description of house generally found among the Esquimaux of Labrador; but the most remarkable houses are those built of the bones of whales and walruses described by Sir Martin Frobisher and Sir Edward Parry. They also frequently construct dwellings of snow and ice. Both Dr. Kane and Dr. Rae, borrowing the suggestion from the natives of this high polar region, constructed dwellings of snow, which they found to be both useful and agreeable. The dress of the Esquimaux consists of furs, in the preparation of which they exercise a degree of ingenuity superior to that of the most skilful furrier. The winter coat is usually made of seal skin, while the summer coat consists of that of the reindeer; but every variety of fur is occasionally used. At Prince William's sound the natives wear skins of the sea otter, fox, raccoon, martin, seal, and water fowl. At Schismareff inlet those of the reindeer and dog are generally used, at Regent inlet those of the polar bear, and at Melville peninsula those of reindeer. The overcoat is supplied with a large hood, often bordered with white fur of the deer, which when drawn over the head presents a lively contrast with the dark face of the wearer. Those worn by the females have a much larger hood than those used by the males, which not only furnishes a covering for the head but a cradle for the infant. The boots of the females are remarkable, and are sometimes made so large in the leg as to resemble a leather sack, which gives a singular and ludicrous aspect to the whole figure. These capacious pouches are used as pockets, as temporary beds for infants, and, when in the vicinage of white men, as receptacles for stolen goods. As they are much upon the water, they devote considerable attention to the construction of their boats. These are of two kinds, the *caiak* or men's boat, and the *oomiak* or women's boat. The caiak, first described by Baffin, is adapted but for one person; it is about 16 feet long, 2 feet broad in the centre, and 1 foot deep, and bears a resemblance to the weaver's shuttle. The bottom is rounded and has no keel. The frame is kept stretched above by 22 little beams, and 2 strong battens run from stem to stern, which toward the centre are attached to a hoop of bone of sufficient size to admit the body. The frame is entirely covered, with the exception of a circular hole in the centre, with freshdressed seal or walrus skin. When complete the boat weighs about 60 pounds, and is so constructed that it can be carried on the head without the aid of the hands. The oomiak is from 20 to 25 feet long, 8 feet broad, and capable of accommodating from 10 to 20 persons. It is composed of the same materials as the caiak, and is often furnished with a lug-shaped sail, formed of the intestine of the walrus, sewed together with great skill in breadths of about 4 inches, and weighing less than 4 pounds. The mast has a neat ivory sheave for the halyards to run on, and is placed well forward. Much taste is displayed upon the bow and stern of the oomiak, but the Esquimaux chiefly prides himself upon the beauty and speed of his caiak, in which he defies the storm, and does not hesitate to approach and give battle to the polar bear and other monsters of these high northern seas. Next to his boat the Esquimaux attaches most importance to his sledge, which is drawn by dogs. It is sometimes constructed of wood, but bone sleds are almost exclusively used at Schismareff inlet and Regent's bay. At Regent's inlet the sled is made of a number of salmon packed together in the form of a cylinder about 7 feet long, encased in skins taken from canoes, and well corded with thongs; 2 of these cylinders are pressed into the shape of runners, and having been left to freeze, are secured by cross bars made of the legs of the deer or musk ox. The bottom of the runner is then covered with a mixture of moss, earth, and water, upon which is deposited about half an inch of water, which congeals in the act of application. These sleds travel more lightly than those shod with iron; but as they cease to be of service when the temperature rises above the freezing point, they are then taken to pieces, and the fish being eaten, the skins are converted into bags and the bones are given to the dogs. The Esquimaux hunt with bows and arrows, spears, and slings. They are fond of ornaments, and carve with much skill. Capt. Logan informs us that he found on the E. coast of America models of men, women, and children, of beasts, birds, and fishes, executed in a masterly style, and with no mean knowledge of anatomy. The ivory or walrus tusks of which they form their models are cut by continued chopping with a knife, one end of the ivory resting on a soft stone, which serves as a block. To smooth and polish the work when finished, a gritty stone is used as a file, and kept constantly wet with saliva. The impressions of Dr. Kane and Dr. Rae, the two most recent travellers among the Esquimaux, are somewhat at variance; while Dr. Kane had reason to doubt their good faith and to suspect them of treachery, Dr. Rae found them simple, well meaning, and trusty. Richardson represents them as scrupulously honest toward each other, but utterly regardless of the property rights of strangers. They subsist almost exclusively upon fish and animal food, which the rigor of the climate enables them to eat raw, and in large quantities. Fat of animals and fish oil constitute their chief delicacies. Mr. John Simpson, who was physician of the ship Plover, Com. Maguire, which wintered twice at Point Barrow (1852 and 1854), wrote "Observations on the Western Esquimaux and the country they inhabit," which are contained in the "Further Papers relative to the recent Arctic Expedition in search of Sir John Franklin," presented to the English parliament in 1855. He states that their principal settlements at Point Barrow, Cape Smyth, Point Hope, and Cape Prince of Wales, are inhabited during the whole year;

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but Wainwright inlet, Icy cape, Port Clarence, and Norton sound, the coasts of Kotzebue sound, and other settlements and huts along the coast, are only inhabited during the winter and deserted in summer. Their commercial places are King-ing on Cape Prince of Wales, Sesua-ling at the mouth of the Nu-na-tak, Nig-a-lek at that of the river Cobrille, and Nu-wu-ak on Point Barter. Four or five Asiatic boats are engaged in the trade, and land their freight at Sesua-ling, where a species of fair is held toward the end of July, which is distinguished not only for its active commercial but also for its pleasant social character. Dealers who reside on the shores of the Nu-na-tak take the most active part in the business, and distribute the merchandise among the people of the interior. They either forward them or bring them annually in ships to the river Colville, where they meet their friends from Point Barrow. In the beginning of August the goods are taken from thence to Point Barter, where they are bartered for English and other products. According to Mr. Simpson, Sir John Franklin was mistaken in his belief that a Russian settlement existed on the Colville river, and that the Russian settlers were called Nu-na-tang-menn, this being the name applied by the Esquimaux to the dealers from the Nu-na-tak, who are the factors of the Russian implements and wares which are found along the N. coast.—It is a question with what portion of the human family the Esquimaux are to be classified. Most ethnologists have classed them with the Mongolians; both Mr. Gallatin and Mr. Duponceau, however, give to them the same origin as that of the hunting tribes of North American Indians, an opinion in which Dr. Prichard entirely coincides. Mr. Gallatin says that "there does not seem to be any solid foundation for the opinion of those who would ascribe to the Esquimaux an origin different from that of the North American Indians. The color and features are essentially the same, and the differences which exist, particularly in stature, may be easily accounted for by the rigor of climate, and partly perhaps by the nature of their food."—See "Synopsis of the Indian Tribes of North America," by Albert Gallatin, in *Archæologia Americana*, vol. ii. (Worcester, 1836), and the narratives of Franklin and the other arctic explorers.

ESQUIRE, or SQUIRE (Lat. *scutifer;* old Fr. *escuier*, a shield-bearer), originally a warrior armed with shield and javelin. Under the later Roman emperors the name was applied to soldiers of the most approved valor, to whom especially was assigned the defence of the palace and person of the emperor. The name was adopted in France, from the earliest period of the monarchy, to designate those holding the first rank in the army, whose bravery was rewarded with free grants of land, and who were styled gentlemen or nobles. By degrees the quality of nobility was distinguished from that of esquire, and a person ennobled for civil services could not take the latter title, which could be gained only in the profession of arms. In the ages of chivalry the office of esquire followed that of valet, or page, and was the last degree of apprenticeship before attaining the honor of knighthood. (See CHIVALRY.) Esquires were attached to the courts of great lords and to the persons of knights, and were divided into various classes according to the offices which they performed. The esquire of the person accompanied his master almost everywhere, carried his helmet, armor, shield, gauntlets, and banner, held the stirrup when he mounted, armed him at the moment of combat, gave the martial cry as he entered battle, and supported him if he was overthrown in the fight. The esquire of honor did the honors of the castle, made preparations for festive assemblies, conducted guests to their chambers, and dressed and undressed his master. In war he kept guard over the prisoners taken by his master. The esquire of the chamber, or chamberlain, had charge of the gold and silver, especially of the plate for the table service. These 3 esquires were treated with confidence and familiarity, and were permitted to approach their master or mistress at any time. The esquire trenchant always stood at the repasts, and his office was to carve the meats and distribute them to the guests. The esquire of the stable was an important officer, his duty being not only to take charge of the horses, but also to keep the arms of the knight in good condition, and to guard against any defect which might be dangerous or fatal to his master in battle. Esquires of all classes were devoted to learning the arts and skill of their master, expecting, usually not before 7 years of service, their elevation to the dignity of knighthood, with the right to assume golden spurs. After the decline of chivalry the title of esquire remained in France attached to various offices. The office of grand esquire or equerry was one of the most considerable in the kingdom, with extensive prerogatives, and the disposal of numerous smaller offices, such as the esquires of the stables. Upon the entrance of the king into cities, he marched immediately before him, carrying the royal sword. Upon the death of the king the horses and harnesses of the royal stable became his property. This office and those dependent upon it were suppressed at the revolution, were revived under the empire and the restoration, again disappeared in 1830, and some of them have been reëstablished by Napoleon III. In England the title of esquire belongs by right of birth to the sons of younger sons of dukes and marquises; to all the sons of earls, viscounts, and barons; to the eldest sons of baronets and of knights of all the orders. The title is also given to the officers of the king's court and household; to the officers of the army and navy down to the captain inclusive; to doctors of law, barristers, physicians, justices of the peace while in commission, and the sheriffs of counties for life. The heads of many old families are also

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deemed esquires by prescription. The title is now hardly more than complimentary in England, as in the United States, and is very generally affixed to the names of gentlemen in the superscription of letters.

ESQUIROL, Jean Étienne Dominique, a French physician and philanthropist, born in Toulouse, Jan. 4, 1772, died Dec. 12, 1840. He was pursuing his studies at Paris when the revolution broke out, and led him to enter the medical service of the army. In 1794 he attended the military hospital in Narbonne, and on his return to Paris he became Dr. Pinel's assistant in the *Salpêtrière*, and took at the same time an able part in the editing of Pinel's medical journal (*Médecine clinique*). In 1799 he founded a lunatic asylum, which became the model of all similar institutions afterward founded in France, and subsequently spent much time in visiting the various lunatic asylums of France. He was appointed physician to the *Salpêtrière* in 1811. In 1817 he opened a course of clinical lectures, in which he pointed out the reforms needed in the treatment of lunatics, and at the same time he prevailed upon the government to appoint a commission on the subject, of which he became the most prominent and zealous member. The new lunatic asylums at Rouen, Nantes, and in the other French cities, as well as many other improvements calculated to benefit the insane, owe their origin to his benevolence. In 1823 he became inspector-general of the university for the faculties of medicine, and in 1825 physician-in-chief to the royal institution for the insane at Charenton. In 1830 he was deprived of his offices in consequence of his opposition to the July revolution, but he continued to the time of his death in the practice of his profession. He contributed many important papers to the *Encyclopédie des gens du monde*, and to the great *Dictionnaire des sciences médicales*. In 1838 he published a more elaborate work: *Des maladies mentales, considérées sous les rapports médical, hygiènique, et médico-légal* (Paris, 2 vols. 8vo.)

ESS, Heinrich Leander van, a German Roman Catholic theologian, born in Warburg, Westphalia, in 1772, died in Affolterbach in 1847. He entered the Benedictine order in 1793, and officiated as pastor in a village from 1799 to 1813, when he became pastor and professor of theology at the university of Marburg. Conjointly with his cousin and fellow Benedictine, Karl van Ess (1770–1824), he published a new German translation of the New Testament (Brunswick, 1807; 20th ed., Sulzbach, 1830), which is highly valued. They also published *Das Alte Testament* (Nuremberg, 1819), and *Die Heilige Schrift Alten und Neuen Testaments* (Sulzbach, 1840). He made himself widely known by his endeavors to promote the reading of the Bible among the Catholics of Germany, for which purpose he wrote *Auszüge aus den heiligen Vätern und andern Lehrern der kath. Kirche über das nothwendige Bibellesen* ("Extracts from the Holy Fathers and other Teachers of the Catholic Church on the Necessity of Bible Reading," 2d ed., Sulzbach, 1822), and *Pragmatica Doctorum Catholicorum Tridentini circa Vulgatam Decreti Sensum nec non licitum Originalis Usum Testantium Historia*, a prize essay (Sulzbach, 1816; German translation, Tübingen, 1824). His views on this subject did not meet with the approbation of the bishops of Germany or of the pope.

ESSÉ, a French village in the department of Ille-et-Vilaine, near Vitry; pop. 1,800. In its environs is one of the finest druidical monuments of France, called *Roche aux fées*, consisting of 43 large rough blocks of stone, 34 upright, supporting 8 others which form a roof.

ESSEN, Hans Henrik, count, a Swedish general, of Livonian descent, born in Kalfas, West Gothland, in 1755, died July 28, 1824. He was educated in the universities of Sweden, and his attainments as well as his graceful and chivalric bearing caused him to become a favorite of Gustavus III. He accompanied that prince in his travels abroad and in the campaign of Finland, was of great assistance to the king in the course of this campaign, and was with him on the fatal night when Gustavus, although warned by Essen against the designs of his enemy, persisted in attending the masked ball, where he was murdered by Ankarstroem. In 1795, after having accompanied the duke of Südermaaland and the young prince Gustavus Adolphus to St. Petersburg, Essen was appointed governor of Stockholm. Subsequently he became governor-general of Pomerania and of Rügen; and in 1807, as commander-in-chief of the Pomeranian army, he distinguished himself by his defence of Stralsund, and brought about an honorable truce with France. But the king was dissatisfied with Essen, and himself assumed the command of the army, which caused him to retire from active service until the accession of Charles XIII. to the throne. Charles created him a count and member of the council, and appointed him ambassador at Paris. Here his efforts were successful, and Pomerania, before passing eventually into the possession of Prussia, was for a short time restored to Sweden. Under Bernadotte he marched in 1813 at the head of the Swedish army against Norway; and when the two countries were united, he became governor of Norway, with the title of Norwegian field marshal and chancellor of the university of Christiania. In 1816 he was removed from this position, but in 1817 he was made governor-general of the old Swedish province of Scania.

ESSENCES. See Essential Oils, and Extracts.

ESSENES, a remarkable Jewish sect, not mentioned in the Jewish or Christian Scriptures, and concerning whom the only original sources of information are passages in the works of Josephus and Philo, both of whom lived about the time when the Essenes had reached their highest point of development. Philo, a

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disciple of the Alexandrian philosophy, and attracted by their mystical and speculative turn, gives the fuller instruction concerning their doctrines. Josephus, who lived in Palestine where the community flourished, and was according to his own statement in early life a member of it, treats of them particularly in their outward relations. The Essenes first appear in history in the latter half of the 2d century B. C., as a society of piously disposed men, who in the solitudes on the western side of the Dead sea sought a retreat from the corruptions and conflicts of the world. They lived an austere life, held their property in common, wore a white robe, prayed and meditated continually, made frequent ablutions, for the most part renounced marriage, and often practised medicine. On account of the latter practice some, as Bellermann and Gfrörer, identify them with the Therapeutæ, and find the origin of their name in the Aramaic word אסא, to cure. They sacrificed no animals, and instead of going themselves to worship in the temple of Jerusalem, they sent their offerings. Contemning logic, metaphysics, and even physical science, as useless, they gave their attention only to ethics, recognized no other authority than their own sacred books, and taught the equality of men and the entire supremacy of destiny. Abstinence and labor were the chief features of their life. Their number at the beginning of the Christian era was about 4,000, and during the religious and political storms which swept over Palestine in the 1st and 2d centuries, they disappeared from view, perhaps by being confounded with the Christian ascetics. In the obscurity which covers their origin and the specialities of their conduct and ideas, they have been variously compared to the old Hebrew schools of prophets, the Greek Pythagoreans and stoics, the Christian monks, and the modern Quakers. De Quincey has sought to identify them with the early Christians, who, surrounded by dangers, assumed the name and mode of life of the Essenes as a disguise, alike impenetrable to Jewish or Roman enemies, and to timid or treacherous brethren. Monographs on the Essenes have been written by Bellermann (Berlin, 1821), Sauer (Breslau, 1829), and Leutbecher (Amsterdam, 1857).

ESSENTIAL OILS, called also volatile oils, and distilled oils, oily products derived from plants, generally by distilling portions of them with water. The aqueous vapor which passes over carries with it the vapor of these oils, though their boiling point is often higher than that of water. They condense together in the receiver of the still, the oil commonly floating upon the water, sometimes sinking beneath it. A portion appears to be taken up by the water, giving to it the peculiar odor and properties of the oil in a less degree. This is called medicated and perfumed water. The oils contain in a concentrated form the fragrance and essential properties of the plant, or of the portion of it employed, and when kept dissolved in alcohol constitute the essences. They may sometimes be obtained by expressing the parts containing them, as the rind of the orange and lemon; and sometimes they are so evanescent as to escape in the ordinary mode of securing them by distillation with water. The method then adopted, as in securing the oil in which lies the delicate fragrance of the tuberose, narcissus, jasmine, &c., is to arrange the flowers in layers with cotton imbued with some fixed and inodorous vegetable oil. This gradually absorbs the volatile oil of the flowers, and when the cotton is afterward digested in alcohol, the volatile oil is taken up by this fluid, and an essence is obtained. It may in some cases be separated also by distilling the cotton with water or alcohol. The odor of the oil is often less agreeable than that of the plant, which is probably owing to its greater concentration, as by dilution it is made more pleasant. The oils are often colored some shade of red, brown, yellow, green, or blue, but this is not always fixed. Their taste is hot and pungent, but made pleasantly aromatic by diluting them. Some, however, are poisonous. They burn with a bright and often smoky flame. The feeling of them upon the hand is not greasy like that of the fixed oils, but rough, and a cork moistened with them grates harshly when turned in the phial. Their specific gravity varies from 0.847 to 1.17. They boil at various degrees, some at 320° F., and a few others require a higher temperature. Exposed to the air and light at ordinary temperatures, they absorb oxygen, become of a darker color, of thicker consistency, and are finally changed into resin, sometimes into acid compounds. Most of them consist, like the fixed oils, of a thin fluid and a solid product, which may be separated at a cold temperature by compressing the substance between folds of paper. The camphor-like product called by Berzelius stearoptene is retained within the folds, while the oily fluid called elaiopene passes through. The ultimate analysis of the essential oils affords in most instances carbon, hydrogen, and oxygen. Some, however, prove to be hydrocarbon, containing no oxygen; and in these the proportion of carbon is between 88 and 89 per cent., and of hydrogen between 11 and 12 per cent., which would be expressed by the formula $C_5 H_4$. Nitrogen is found as a constituent of some of them, and sulphur is met with in the oils of mustard and of horse radish. The agreeable odors retained by many of the oils cause them to be largely used in perfumery. Their medicinal properties also render many of them valuable agents in pharmacy, especially as powerful stimulants. Some are largely employed in the manufacture of paints and varnishes, and some have been used for illuminating purposes.—Essential oils are frequently adulterated. The presence of fixed oils added to them for this purpose may be detected by the greasy stain left upon paper moistened with the liquid and exposed to heat sufficient to drive off the volatile oil. Alcohol is detected by various tests, as by adding water

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and agitating the mixture, which becomes milky if alcohol is present, and the bulk of the oil is reduced as the fluids separate on standing, by the alcohol leaving it and going with the water. A piece of potassium as large as the head of a pin will remain nearly 15 minutes in contact with a dozen drops of pure oil without change; but if it disappears in 5 minutes, the oil contains at least 4 per cent. of alcohol; if it disappears in one minute, it contains at least 25 per cent. Fused chloride of calcium is also used to abstract alcohol from the oils. When the high-priced oils are adulterated with the cheaper kinds, a thorough practical acquaintance with the physical properties of the oils can alone serve to detect the imposition. The odor of oil of turpentine when used for this purpose is concealed, until the oil is dissolved in alcohol, and water is added, when both the odor and flavor are easily recognized. The oils require to be kept in small bottles entirely filled, well stopped, and excluded from the light.—By means of recently devised chemical processes artificial essences imitating the flavors of various choice fruits are prepared from substances which would seem entirely unfitted for producing such results. Thus butyric acid, a product of butter or putrid cheese, being converted into an ether, cannot be distinguished from that prepared from the pineapple, and may be used equally well with the latter to flavor rum to produce the celebrated pineapple rum. The fetid fusel oil, separated from brandy and whiskey in rectifying these liquors, produces, when distilled with sulphuric acid and acetate of potash, an essence of pears; and if for the acetate of potash bichromate of potash be substituted, the product is an essence of apples. By similar methods a variety of other flavors are obtained; and though when concentrated they are acrid, they become very agreeable when used as flavoring in proportions of a drop to an ounce or two ounces. At the great exhibition of 1851 the ices prepared for the refreshment of the visitors were flavored by these artificial essences. Some of the choicest perfumes are by similar chemical processes prepared from substances which seem strangely foreign to their nature.

ESSEQUIBO, a district of British Guiana, now united with the co. of Demerara, and comprising the regions drained by the great river from which it takes its name; pop. in 1851, 24,925, of whom about 15,000 were natives of the district. Nearly all the land west of the Essequibo river is fertile, but uncultivated, and peopled almost wholly by small tribes of Indians. Essequibo was settled by the Dutch in 1627, and surrendered to the English in 1781, but was restored in 1783. It was again taken in 1803, since which it has remained a British colony.—Esseqtibo, a large river traversing the above district, formed by the union of several small streams which rise in the Sierra Ariena or Acaray, near the S. boundary of the territory, flows N. E. and N., and after a course of about 450 m., much of which lies through magnificent forests, enters the Atlantic in the N. W. part of the colony, by an estuary 14 m. wide. It forms many islands, 3 or 4 of which, of considerable size, are in its estuary. The *manati*, or river cow, the electric eel, and the *peri* or *omah*, a voracious fish about 2 feet long, remarkable for the strength of its jaws and teeth, are inhabitants of its waters. Its entrance is dangerous even for small craft, on account of numerous banks of mud and sand, and its course is obstructed by several falls and rapids, the lowest of which are 50 m. from its mouth. They can be passed by small vessels, though not without danger. At a distance of 45 m. from the sea, where it enters the low plain, the river is a mile wide, and gradually increases in width to its mouth. One of its sources was reached by Sir R. Schomburgk, in lat. 0° 41′ N. Its principal affluents are the Ripununy or Rupunoony (220 m. long), Masseroony, and Cuyuni. The Dutch formerly had, on the banks of this river, indigo, cacao, and cotton plantations, all traces of which are now covered by the dense vegetation of the forests. Gold has been found along the upper course of the stream.

ESSEX, the name of counties in several of the United States. I. A N. E. co. of Vt., bounded N. by Canada, and E. by the Connecticut river, which separates it from New Hampshire; area, 790 sq. m.; pop. in 1850, 4,650. It is traversed by the Grand Trunk railway from Portland to Montreal. The surface is rough and mountainous, with numerous small lakes and ponds scattered over it. The soil is well watered, but, except in the valley of the Connecticut, not remarkable for fertility. Potatoes, oats, and grass are the staples. In 1850 the productions amounted to 94,124 bushels of potatoes, 45,597 of oats, 14,972 tons of hay, 292,615 lbs. of butter, and 122,321 of cheese. There were 8 churches in the county, and 1,666 pupils attending public schools. Organized in 1792, and named from Essex, England. Capital, Guildhall. II. A N. E. co. of Mass., bounded N. by New Hampshire, and E. and S. E. by the Atlantic and Massachusetts bay, and traversed by the Ipswich and Merrimack rivers, the latter of which is navigable as far as Haverhill by vessels of 200 tons; area, about 500 sq. m.; pop. in 1855, 151,018. The surface is generally rough and the soil hard and rocky. It is carefully cultivated, however, and in many places has been rendered very productive. The chief sources of wealth are commerce and the fisheries, for the prosecution of which the long line of seacoast broken by beautiful bays offers great advantages. The interior towns are extensively engaged in the manufacture of leather, shoes, and cotton. The productions in 1855 were 186,026 bushels of Indian corn, 1,260 of wheat, 16,192 of rye, 30,355 of oats, 290,286 of potatoes, 36,394 tons of hay, and 533,853 lbs. of butter. There were 20 cotton mills, 23 woollen mills, 2 carpet factories, 1 worsted factory, 1

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linen factory, 1 silk factory, 99 forges, 6 manufactories of steam engines and boilers, 8 of other machinery, 4 of iron railing, &c., 4 of paper, 78 of cars, coaches, and wagons, 23 of soap and candles, 9 of gas, 3 distilleries, 4 breweries, 99 tanneries, and 15 boat yards. In 1859 it had 23 newspapers and magazines, and 204 churches. Railroads leading to Boston, Gloucester, Portsmouth, Portland, Manchester, and numerous other places, pass through the county. It was organized in 1642. Seats of justice, Salem, Ipswich, and Newburyport. III. A N. E. co. of N. Y., bordering on Lake Champlain, and partly bounded on the N. by the river Au Sable; area, 1,656 sq. m.; pop. in 1855, 28,539. The country along the lake shore is tolerably level, but the N. W. part is occupied by the Adirondac mountains, which are covered with thick forests. Tahawus or Mt. Marcy, 5,337 feet high, is the principal summit, and the highest in the state. The county is drained by the head waters of Hudson river, and by Bouquet and Scroon rivers, which afford valuable water power, and has numerous small but picturesque lakes. The soil is well watered and productive, yielding fair crops of Indian corn, hay, and potatoes. The productions in 1855 were 46,493 bushels of wheat, 105,369 of Indian corn, 234,946 of oats, 318,021 of potatoes, 39,140 tons of hay, 625,542 lbs. of butter, and 134,735 of wool. There were 3 woollen mills, 2 carding mills, 25 iron manufactories, 2 furnaces, 1 paper mill, 16 grist mills, 73 saw mills, 3 newspaper offices, 176 schools, and 51 churches. Iron, limestone, plumbago, and marble are the principal minerals. The county was formed from a part of Clinton in 1799. Capital, Elizabethtown. IV. A N. E. co. of N. J., bounded E. by Passaic river, Newark bay, and Staten Island sound, and W. by Passaic river; area in 1855 (since which time Union co. has been formed from its S. part), 450 sq. m.; pop. 95,199. The general character of the surface is level, but there are two elevated ridges in the western part known as First and Second mountains. Much of the soil is highly fertile, producing grain, potatoes, and good pasturage. In 1850 it yielded 297,076 bushels of Indian corn, 151,765 of oats, 159,148 of potatoes, 29,287 tons of hay, and 378,233 lbs. of butter. There were 6 cutlery and 16 edge tool manufactories, 13 iron founderies, 3 brass founderies, 1 type foundery, 13 machine shops, 11 patent leather manufactories, 16 flour mills, 15 paper mills, 3 manufactories of India rubber, 3 of woollen, 2 of cotton, 2 of shawls, and a great number of minor establishments. There were 80 churches, 9 newspaper offices, 7,475 pupils attending public schools, and 3,714 attending academies and other schools. The New Jersey, New Jersey central, and Morris and Essex railroads, and the Morris canal intersect the county. Organized in 1710. Capital, Newark. V. An E. co. of Va., bounded N. E. by Rappahannock river; area, about 300 sq. m.; pop. in 1850, 10,206, of whom 6,762 were slaves. It has an uneven surface in the W. part; the soil is generally sandy, of little natural fertility, but greatly improved by the use of marl, guano, and lime. The chief staples are wheat and Indian corn. The productions in 1850 amounted to 391,895 bushels of Indian corn, 104,840 of wheat, and 57,747 lbs. of butter. There were 11 churches, and 216 pupils attending public schools. The county was formed in 1692. Capital, Tappahannock. Value of real estate in 1856, $2,069,435.

ESSEX, a S. W. co. of Canada West, comprising a peninsula between Lakes St. Clair and Huron, and having an area of 677 sq. m.; pop. in 1851, 16,817. It is traversed by the Great Western railway, the W. terminus of which is at Windsor in this county. Capital, Sandwich.

ESSEX, a county on the E. coast of England, bounded S. by the river Thames; greatest length from S. W. to N. E., 60 m; greatest breadth, 45 m; area, 1,657 sq. m.; pop. in 1851, 369,318. Except in the N. W., where there is a continual succession of hill and dale, the surface is nearly level, and in the S. and E. is partly occupied by large marshes. The soil is fertile, and the farms are accounted among the best in the kingdom. Grain, especially wheat, which is of excellent quality, is the staple production. The production of veal, for which Essex is famous, forms an important branch of agricultural industry. Valuable fisheries and oyster beds furnish employment to the inhabitants of the coast and adjacent islands. About 15,000 bushels of oysters are taken every season, and a capital of between £60,000 and £80,000 is invested in the trade. Silk is manufactured, and straw plait is made for London use. The principal channels of communication are the Eastern Counties railway and the rivers Thames, Lea, Stort, Chelmer, Stour, and Colne. Chelmsford, the county town, Colchester, Harwich, and Maldon are the chief towns. The county returns 4 members to parliament.

ESSEX, Earls of. See Devereux.

ESSLING. See Aspern.

ESSLINGEN, a town of Würtemberg, Germany, capital of a bailiwick of the same name, situated on the Neckar, on the railway to and 7 m. E. of Stuttgart; pop. 7,920. It is a very active commercial and manufacturing town. The locomotives made there are celebrated, as also a species of wine called *Esslinger Champagner*. It contains a normal school, a school for the deaf and dumb, a ragged school, and an establishment for the cure of nervous affections. In the neighborhood, on the Rothenberg, is situated the Greek chapel, which contains the statues of the four evangelists by Dannecker and Thorwaldsen.

ESTAING, Charles Hector, count d', a French naval officer, born at the chateau of Ruvel, in Auvergne, in 1729, executed in Paris, April 28, 1794. He first joined the army, served in the East Indies under Lally as brigadier, and was made prisoner at the siege of Madras in 1759, but released on parole. He then enter-

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ed the navy, and inflicted great damage on the English in the East, but on his return was captured near Lorient by the British cruisers. The treatment to which he was subjected at Portsmouth, on pretence that he had broken the parole given at Madras, led him to vow eternal hatred to England; and in 1778, having reached the grade of lieutenant-general of the navy, and refused the rank of vice-admiral, he took command of a fleet of 16 vessels designed to cooperate with the United States. He arrived in Delaware bay in July, and in August made a demonstration against Newport, obliging the British to destroy 6 of their frigates lying there, but failed in the main object, owing to the inability of the Americans to come to his support in proper season. His fleet was soon after shattered in a storm, while endeavoring to come to action with the ships of Lord Howe; whereupon he proceeded to Boston to refit, after a sharp quarrel with Gen. Sullivan, who wished him to renew the attack upon Newport. The count's course was bitterly condemned by the American people, and some even accused him of perfidy; but in the present instance he seems to have been ruled by his own officers, with whom it is said that his rapid promotion on exchanging the land for the naval service made him unpopular. Having refitted, he sailed for the West Indies, where he failed in an effort to take Saint Lucia, but made himself master of the islands of Saint Vincent and Grenada, and had an indecisive engagement with Admiral Byron. In Sept. 1779, he appeared off Savannah with the purpose of acting against that city in concert with Gen. Lincoln; but having first lost a favorable opportunity for attack by giving the British time to complete their defences under cover of a truce, he next ruined the enterprise by a precipitate assault when he should have besieged in form. In this action Pulaski was killed, and D'Estaing was wounded in the arm. He returned to France in 1780, was a member of the assembly of notables in 1787, was chosen commandant of the national guard of Versailles in 1789, and afterward went to reside in Paris, where he enrolled himself as a private in the national guard. He gave in his submission to the assembly after the flight of the king, was made admiral and put on the retired list in 1792, but falling under the suspicion of the terrorists, was finally led to the guillotine.

ESTATE (Lat. *status*), in law, a term usually expressing an interest in lands, though in a general sense it is applied to both real and personal property, as we sometimes see in wills and the like. But when used with a discriminative signification to designate the nature and limit of the interest, it properly relates to lands only. We shall in this article merely define the several classes of estates, without going into an extended illustration of their legal incidents. I. An estate of inheritance, which is sometimes expressed by the term fee. Thus when we say a man has the fee of lands, it is meant that he has an inheritable estate; and in the United States, where there is no limitation to particular heirs, it is understood to be the entire proprietorship of the lands. But in England there are estates of inheritance in fee simple and fee tail, the former being an estate which descends to a man's general heirs, the latter being limited to certain specified heirs, as for instance to a man's issue male or female, or to the heirs of his body begotten of a certain wife. By such limitations, although the estate descends to the particular heirs, yet failing them it reverts to the grantor or supposed original proprietor, instead of descending to a man's general heirs; and so far there is an obstruction in the enjoyment of the estate, because a man is perpetuated in and represented by his heirs. In this sense a fee simple is deemed an absolute ownership, in distinction from a fee tail, which is limited in descent. Another distinction, however, was more important, viz.: that while the former could be conveyed or devised, the latter in theory could not be, yet practically it could be alienated by a particular form of proceeding called a common recovery. Yet a fee simple is not necessarily the entire proprietorship, for it may be subject to encumbrances by mortgage or judgment and otherwise; and smaller estates, as a lease for years, may be carved out of it, though in such case it would be more proper to call the principal estate a fee simple in reversion or remainder. There are also qualified or determinable estates of inheritance, by which is meant that the estate may be determined by some contingency, and yet the contingency may never happen, and therefore by possibility the estate will be perpetual. The illustrations of this species of inheritance are for the most part hypothetical, as to a man and his heirs so long as St. Paul's church shall stand. Sometimes the qualification is residence in a particular place. Or again, there may be a restriction that the person taking the estate shall not marry, an instance of which we have in the case of a devise by a man to his wife on condition that she shall continue a widow. When by the limitation an estate is to last till a certain event, there is until the event happen an inheritance subject to being determined; though if the event become impossible, then the estate is converted into a fee simple absolute. A conveyance by the owner of a determinable fee will of course be subject to the qualification or contingency upon which the estate depends. It may be a question, in the case of a limitation to a man and his heirs so long as they reside in a certain place, what the effect of alienation would be; but probably the same rule would apply, viz.: that it would be valid to the extent of the right which the grantee himself had, but would be defeated by a breach of the condition. If this would be inconsistent with the nature of the estate, the restriction would, it may be presumed, be void under the statutory rule which has been adopted in the state of New York, whereby the power of alienation cannot be suspended by any limitation or condition whatever

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for a longer period than two lives in being at the creation of the estate. II. An estate for life. This may be either by express grant or by operation of law. Of the latter kind are dower and curtesy, the respective interests of the wife and husband, each in the lands of the other, in case of survivorship. Estates for life as well as inheritance are included in the common denomination of freehold (*liberum tenementum*); which term seems to have been derived from the ancient mode of conveyance, which was by livery of seisin, that is, delivery of possession according to the form of feudal investiture. Other estates which were of an inferior nature could be transferred without this formality. It was chiefly, however, as a distinction from copyhold estates that the term was used. The copyhold was originally an estate at the mere will of the lord, but became established by prescription, the evidence of which was in the rolls of the courts baron, whence the estate was said to be held by copy of court roll; and although it thus became independent of the will of the lord, it was still deemed a base tenure, and the form of conveyance was by surrender to the lord, and a new grant by him to the alienee, admitting him to be tenant of the copyhold upon the same terms by which the estate had been formerly held. An estate for life may be either for the life of the tenant himself or of another person. The latter is usually designated as an estate *par autre vie*. III. Estates less than freehold are for a term of years, or at will, or by sufferance. The first is for a definite period; but whatever may be the length of the period, even if it should be a thousand years, it is still inferior to a freehold, and is classed in law with chattel interests. Thus, upon the death of the tenant, his lease is included with the personal property to be administered as assets, instead of going to the heir. In the state of New York, by statute, leases for a term of years are denominated chattels real; they are made subject to the lien of a judgment, but are to be administered as personal estate by an executor or administrator. An estate held by the deceased for the life of another person is included under the same rules. An estate at will was when lands were occupied by the tenant with consent of the landlord, but without any agreement as to the time the tenant should be permitted to remain. It can hardly be said to exist at present, as the courts now hold a tenancy where no certain term is agreed upon to be from year to year, and reasonable notice must be given of the intention to terminate it. The circumstance that distinguishes the two kinds of tenancy is the reservation of a certain rent, which may be either by express agreement, or by implication from the receipt of rent. If a certain rent is payable, it constitutes an estate from year to year; but if neither rent nor time of occupation be specified, it would be a tenancy at will. An estate by sufferance is where the tenant has been in possession by lawful title, but wrongfully holds over after the determination of his interest. In such a case the tenant holds by the mere laches of the landlord, and is subject to being turned out by summary proceedings. But any act of the landlord affirming the wrongful holding, as receipt of rent, would convert the naked occupancy into a tenancy from year to year, and is then determinable only at the end of the year. One month's notice to quit is required by statute in New York before taking summary proceedings; but 6 months' notice is necessary to enable the landlord to proceed by action of ejectment. The English statute of frauds (29 Charles II.), which has been generally reënacted in the United States, requires leases for a term of more than one year to be in writing; and in the state of New York a lease for a term exceeding 3 years must be recorded, or it will be inoperative against subsequent *bona fide* purchasers. Another distinction in the nature of estates has reference to the time when the right is reducible to possession. The right may exist prospectively, and it is then termed an estate in expectancy. It is of two kinds: one created by the act of parties, and called a remainder; the other by operation of law, and called a reversion. An estate in remainder is what remains after a particular estate, either for years or life, to take effect in possession immediately after such estate, and must be created at the same time, though limited to commence in possession at a future time. Thus if a life estate be granted to A, with remainder to B for life, and remainder to C in fee, here are two remainders to commence in future, and the whole property constitutes but one estate. Yet in ordinary phraseology, where there is but one remainder including the whole residue of the estate, the fee is said to be in the person to whom such limitation is made. An estate in reversion is the residue of an estate left in the grantor or his heirs or in the heirs of a testator after the determination of a particular estate granted or devised. The estate reverts by operation of law, and a reservation to the grantor by the deed would have no effect, being only what the law itself prescribes. A contingent remainder is when the limitation depends upon a contingency which is uncertain or may not occur till after the determination of the particular estate; though it is held that such contingency must not be a remote possibility, as if the limitation should be to the heirs of a child not yet born. A single illustration of this kind of estate will be sufficient. If a grant be made to A for life, with remainder to the heirs of B, and B should survive A, inasmuch as he cannot have heirs while living, the remainder would fail; but if the limitation be to A and B during their joint lives, with remainder to the survivor, here the remainder will take effect, though it is uncertain as to the person who will have the benefit of it. An executory devise is a disposition of an estate by will which would not be valid if made by deed, as a limitation of a contingent remainder. The distinction is that

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the remainder must take effect immediately upon the determination of the particular estate or not at all; whereas an executory devise is good without a particular estate to support it. Thus if a devise be made to A, to take effect on his marriage, in this case until such marriage the fee descends to the heir at law, subject to being divested by the performance of the condition. There is still another distinction of estates growing out of the nature of the possession, under which head are classed joint tenancy, tenancy in common, and coparcenary. The last of these, which is a descent of an inheritance to female heirs, in which case they take an equal interest in the entire estate, but without being subject to the rule which applied to joint tenancy as to the right of the survivor to the whole, does not exist in the United States, at least is not distinguishable from a tenancy in common. By statute the descent of lands is to all the children, male and female, who hold as tenants in common. So joint tenancy, the peculiar feature of which is that the whole estate vests in the survivor, has been abolished in this country, except in respect to executors and other trustees, and except also when it is expressly declared in the deed or will creating the estate that it is to be held in joint tenancy. In all other cases, where there is a possession of lands by several persons without any separation into specific parts, it is a tenancy in common; and it is not necessary that they should all hold by the same title, or have an equal interest; it is sufficient if each has an interest, and that it is undivided. Such an interest can be conveyed or devised, the same as property held in severalty, and partition may be compelled by either party on application to a competent court. Various equitable interests in lands will be discussed in the article Trusts. —We have thus far considered estates of a corporeal nature only; but there are also incorporeal estates, such as rents, easements, &c. But the general principles applicable to the one class will also apply to the other; and whatever there may be peculiar to any particular species of incorporeal estate will be treated under the appropriate head.

ESTE, a princely house of Italy, from which several European dynasties are descended. Its genealogy is conflicting until the 9th century, from which period it is traceable to the petty princes who held Tuscany and other Italian states as imperial fiefs under the Carlovingian emperors. The name of Este was derived from the castle and town of Este (anc. *Ateste*), 15 m. from Padua, formerly a Roman colony of some note, and now a town of about 9,000 inhabitants in the Venetian delegation of Padua. The more immediate founder of the house was Alberto Azzo II. (born 996, died 1097). By judicious management and by grants from the emperor of Germany he added to the fiefs and manors which he had inherited from his father and uncle until they reached the number of about 80, including the margraviate or marquisate of Este. By his sons Guelfo IV. (Welf) and Folco I., the Este family was divided into two great German and Italian branches. Guelfo IV. was Alberto Azzo's eldest son by his first wife, Kunitza or Kunigunde, a Bavarian princess of the German house of Welf, who counted their ancestry back to the times of Charlemange. He inherited from his uncle the duchy of Carinthia and the march of Verona, and succeeded to the dukedom of Bavaria in 1071. Through his descendants, the Bavarian dukes, Henry the Proud and Henry the Lion, he became the progenitor of the elder or German branch of the house of Este, from which the lines of Brunswick and Hanover (known also by the name of Este-Guelph) and the reigning dynasty of England are descended. Folco I. (1060–1135), one of Alberto Azzo's sons by his 2d wife Garsenda, heiress of the counts of Maine in France, became the founder of the principal younger or Italian branch of the house, from whence came the former dukes of Ferrara and the present dukes of Modena. Folco I. was succeeded as marquis of Este by his son Ubizzo (died in 1190), who was confirmed in all his possessions by the emperor of Germany (1184), and appointed marquis or imperial vicar of Milan and Genoa. The foundation of their influence in Ferrara was laid in the 12th century by the marriage of a marquis of Este with Marchesella, the last offspring of the Adelardi family, the popular leaders of the Guelphs against the powerful Ghibelline family Taurello. This marriage secured to the Este family a great political influence, and the possession of Ferrara and of other important Italian towns. Azzo VI. (1170–1212) was placed in 1208 at the head of the government of Ferrara with power to appoint his successor. He was the leader of the Guelphs against Ezzelino, the champion of the Ghibellines. Azzo VII. (1205–1264) defeated Ezzelino, and was hailed as the saviour of Lombardy. Ubizzo III. and Nicolo I., sons and successors of Aldobrandino II., took possession of Modena, May 13, 1336. Their brother Rinaldo died during the siege of that city, Dec. 31, 1335; Nicolo died May 1, 1346, and Ubizzo in May, 1352. The titles of duke of Modena and Reggio and of Ferrara were formally conferred upon the marquis Borso of Este (died in 1471), the former in 1452 by the emperor of Germany, and the latter at a subsequent period by Paul II., who held Ferrara as a papal fief. Borso and many of the succeeding dukes were distinguished for their patronage of art and letters. Ercole I. (1433–1505) was the friend of the poet Boiardo or Bojardo, who was often employed in his service. Among the distinguished visitors of his brilliant court was the youthful Ariosto, who afterward became the protégé of Ercole's sons, Cardinal Ippolito of Este (1479–1520) and Alfonso I., the husband of Lucrezia Borgia (1486–1534), who succeeded his father as duke of Ferrara and Modena. This cardinal of Este was the same prelate who became so jealous of his natural brother Giulio that he was accused of having caused him to be

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blinded. He must not be confounded with his nephew, Cardinal Ippolito of Este, the younger, a brother of Alfonso's successor, Ercole II. (1508–1519), who built the Estensian villa at Tivoli near Rome. Ercole II. was succeeded by Alfonso II., who was the last legitimate prince of the house of Este, whose court was renowned for its splendor, and whose name, as well as those of his sisters Lucrezia and especially Eleonora, are associated with the misfortunes of the poet Torquato Tasso. The power of the Este family in Ferrara expired with Alfonso II., who died in 1597. His nephew Cesare (a natural son of Alfonso I.) succeeded him, but Ferrara was seized by Clement VIII. as a papal fief. Cesare was compelled to evacuate the city, Jan. 28, 1598, but retained the duchies of Modena and Reggio. These duchies were taken by Napoleon I. in 1797 from the duke Ercole Rinaldo (1727–1803), and annexed to the Cisalpine republic. The male line expired with him, and his only daughter Maria Beatrice (1752–1829), the last offspring of the Italian branch of the house of Este, married the archduke Ferdinand, 3d son of Francis I. of Austria, who became the founder of the family of Austria-Este. The possessions of Massa Carrara were inherited by her oldest son Francis IV. (1779–1846), who was reinstated as duke of Modena in 1814, and was succeeded by Francis V., archduke of Austria-Este, who was duke of Modena in May, 1859, when war broke out between Austria and France and Sardinia. The name of Este was adopted by the children of the duke of Sussex (1774–1843) and Lady Augusta Murray de Ameland (died in Rome, March 5, 1830). The marriage of the duke with Lady Murray having been deemed a violation of the royal marriage act passed in the reign of George III., it was annulled by the prerogative court and dissolved in Aug. 1794. Their daughter, Augusta Emma d'Este, was married in 1845 to Sir Thomas Wilde (afterward Baron Truro), who died Nov. 11, 1855. Their son, Augustus Frederic d'Este, a colonel in the army, born Jan. 13, 1794, died in Dec. 1848. After the death of William IV. he claimed his recognition as a member of the royal family, but the Hanoverian council of state, to whom he submitted his claim in 1834, refused to take it into consideration. After the death of his father his claims to the dukedom of Sussex were disallowed by the house of lords (July 9, 1844).

ESTERHÁZY (or ESZTERHÁZY) OF GALANTHA, a noble Hungarian family, who trace their origin to the 10th century, though there is no authentic record of their existence till the 13th. The oldest branch of the family were created in 1622 counts of Forchtenstein (Hung. Fraknó), and afterward princes of the empire. Among its eminent members were Paul (Hun. Pal) IV. (1635–1713), palatine of Hungary, who contributed among others to the deliverance of Vienna in 1683; Nicholas (Miklós) III. (1740–1790), who was a zealous patron of science and art, especially of music, Haydn the composer having been his chapel master for 30 years; and Nicholas (Miklós) IV. (1765–1833), distinguished as a diplomatist and as the founder of a splendid picture gallery at Vienna. It is said that the crown of Hungary was offered to him by Napoleon in 1809, but that he declined it.—PAUL ANTHONY (PÁL ANTAL), son of the preceding, born March 10, 1786, officiated as Austrian ambassador at various courts of Europe, and for several years at that of St. James, where he lived in a magnificent style. In 1848 he occupied for a few months a seat in the Hungarian ministry under Count Louis Batthyanyi, retiring as soon as it became evident that the political independence of Hungary was not possible without a rupture with Austria. He is the present representative of the oldest branch of the Esterházy family, and the most extensive landholder in the Austrian empire; his possessions comprising manors, chateaux, villages, and estates in Hungary, amounting to hundreds. Beside these he owns the manors of Pottenstein and Schwarzbach in Lower Austria, Gailingen in Baden, and Edelstetten in Bavaria. The central administration of his Hungarian possessions is at Eisenstadt, a town 12 m. from Oedenburg, which contains a magnificent palace. In the park is an orangery with 400 orange trees and numerous other species of exotic plants. North of the town are the princely zoological gardens. Other celebrated palaces of the prince are in the village of Esterház (Lower Hungary, circle of Oedenburg on the lake of Neusiedl) and at Vienna. The heir to his title and estates is his son NICHOLAS, born June 25, 1817; married in 1842 a daughter of the earl of Jersey, who died Nov. 17, 1853.—Count VALENTINE (VALENTIN), a member of the Lanschitz branch of the Esterházy family, born Jan. 28, 1814, was Austrian ambassador in Stockholm, in Munich, and from 1854 to 1858 in St. Petersburg. During the Crimean war he was deputed (Dec. 28, 1855) by the Austrian court to propose terms of peace to the Russian government, which were accepted Jan. 11, 1856.

ESTHER (Heb. *Hadassa*), the name of a Persian queen of Jewish descent, wife of Ahasuerus, and also the title of the Biblical book that contains her history, and the interesting narrative of the delivery of the Jews by her from a general massacre that was to take place on the 13th of the month Adar, throughout the whole Persian empire. The book is one of the smallest historical works of the Hebrew Scriptures, and one of the 5 so called *Megilloth*, and belongs to the Hagiographa. It is written in remarkably correct, but somewhat modern Hebrew, and distinguished by some new words, and the total absence of any reference to God, notwithstanding the decidedly providential, though not unnatural, concatenation of the events related. It is chiefly this circumstance which has led to the conclusion of some critics, that the book is a translation of, or extract from, a Persian chronicle, though its authorship has also been attributed to Ezra, Mordecai, and other distinguished Jews. The book narrates how the king, incited by his vindictive minis-

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ter Haman, who was incensed by the independent spirit of the Jew Mordecai, resolved upon the massacre of all the Jews in his dominions, but was turned from his wicked purpose by Esther, who, inspired by Mordecai, saved her nation at the risk of her own life. To commemorate the almost miraculous salvation of their people, and the destruction of their enemies, Mordecai and Esther introduced the fast of the 13th of Adar, the day of danger, and the festival of Purim or lots, still celebrated by the Jews on the 14th and 15th of the same month, as days of entertainment and joy, and for sending presents to each other, and alms to the poor. On the former of these days the *Megillah* is read in the synagogues. The Persian name of the queen has been differently translated; and that of the king Ahasuerus, "who reigned from India to Ethiopia over the 127 provinces of the empire of Persia and Media," is a source of contradictory hypotheses among critics. From the last king of Media down to the last king of Persia, each monarch of that united empire has had his advocate. The claims of Xerxes, the mighty, luxurious, and fickle invader of Greece, are best supported by his character; those of Artaxerxes Longimanus, by the authority of the Septuagint and Josephus. The apocryphal additions to the book caused it to be violently attacked by Luther.—By a singular coincidence, another Jewess Esther also attracted the love of a mighty gentile king, Casimir the Great of Poland (1333–1370), became his mistress, and caused a great deal of good to her people, in a time of most barbarous persecutions. Her history has been adorned by the romantic pen of Bernatowicz, Bulgarin, Bronikowski, Jósika, and others; and her memory is preserved by the tomb of Lobzów, near Cracow, once her residence.

ESTHONIA (Ger. *Esthland;* Esth. *Wiroma*), a government of European Russia, extending along the S. side of the gulf of Finland, having the Baltic sea on the W., the government of Livonia and Lake Peipus on the S., and the government of St. Petersburg on the E., and including Dago and some smaller islands in the Baltic; area, 7,993 sq. m.; pop. about 320,000, consisting chiefly of Esthonians (formerly called by the Russians *Tchuds*), but including also many Russians, Germans, Swedes, and Danes. Its capital is Revel, which name is also often given to the whole government. The surface is generally low, sandy, rocky, or marshy, and is interspersed with more than 200 lakes, but produces abundantly grains, flax, and pulse. There are many extensive forests of firs and birches. The climate is moist, cold, and salubrious; the winter continues for 8 months, and the transition to summer is sudden. The fisheries are productive, agriculture receives great attention, and the rearing of cattle, and particularly of sheep of the merino and Saxon breeds, is an important interest. Lutheranism is the prevalent religion, but there are also many adherents of the Greek church. The government of Esthonia is divided into 6 districts, Revel, Hapsal, Weissenstein, Wesenberg, Leal, and Kunda. Its governor is under the orders of a governor-general who resides at Riga, and who has authority also over Livonia and Courland.—The Esthonians are of Finnish descent, of slight stature, daring, and vindictive. They embraced Christianity about the beginning of the 13th century, and fell successively under the power of the merchants of Bremen, the Danes, the Teutonic knights, the Livonian knights (Porte Glaive), and the bishops of Riga and Ungannia. Threatened in 1555 with conquest by Russia, they preferred to recognize the authority of Eric XIV., king of Sweden, whose successors gave legal sanction to the rights of the Esthonians by various treaties, especially by that of Oliva in 1660. In 1710 the country was conquered by Peter the Great in his war with Charles XII., and was definitely confirmed to Russia by the treaty of Nystadt in 1721. The population was from that time kept in the grossest ignorance and degradation, living with their cattle in miserable huts, the doors of which served also for windows and chimneys. Attempts for their emancipation were made by Alexander I. in 1816, who founded schools among them. The Esthonian lords are chiefly of the German race, and to their efforts the ameliorations are to be attributed. There are Esthonian popular songs, of a naïve and melancholy character, versified in the Finnish manner, that is, metrically and alliteratively. The oldest of these is a song of the peasants of the canton of Revel, which has been sung from the time of the introduction of Christianity.

ESTIENNE, or ÉTIENNE, a celebrated French family of printers. See STEPHENS.

ESTILL, an E. co. of Ky., intersected by the Kentucky river; area about 300 sq. m.; pop. in 1850, 5,985, of whom 411 were slaves. It is well supplied with water power, and rich in coal and iron. The surface is uneven or mountainous, and there are many extensive forests. The soil, which is moderately but not uniformly fertile, is suitable for the production of grass and various kinds of grain, and in 1850 yielded 291,728 bushels of Indian corn, 18,629 of oats, and 24,150 lbs. of tobacco. There were 10 churches, and 215 pupils attending public schools. This county was formed in 1808, and named in honor of Capt. James Estill, who fell in an engagement with the Indians in 1782. Capital, Irvine.

ESTOVERS, a Norman term, equivalent to necessaries. The most ordinary use of it was in reference to the right of a tenant of lands to take wood necessary for domestic or farming purposes. In such case it was an exclusive right, and related to wood upon the leased premises. But there could be also common of estovers, that is to say, a right of taking wood from other lands, either in common with other persons, or it might be an exclusive privilege appendant to a particular tenement. The alimony of a wife who had obtained a divorce *a mensa et thoro* was formerly called estovers, and could be recovered by a writ *de estoveriis habendis*.

ESTRAYS, or STRAYS, domestic animals,

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usually designated as cattle, which are found wandering in enclosed lands, and the owner of which is unknown. In England they belong to the proprietor of the manor on which they are found, provided that after proclamation in the church and two market towns the owner does not appear to claim them within a year and a day. In the old books estrays were described as *pecus vagans, quod nullus petit, sequitur, vel advocat;* therefore dogs and cats were not included; a swan might be, but no other fowl. In New York, estrays, which by statute are neat cattle, horses, and sheep, found in enclosed grounds between the months of November and April, may be sold by the owner of such grounds who shall have taken up such estrays, upon a certain notice to the town clerk; the proceeds, after paying the expenses of keeping and of sale, to be paid over to the supervisor for the use of the town unless the owner shall claim the same within a year after the sale. The limitation to that particular period of the year is probably because at other times cattle are often at large, and find sufficient sustenance by the roadside or upon common lands. In case of damage done by cattle in enclosed lands, a different remedy is provided, viz., by putting them in a pound, and a sale by the pound master to pay such damages and the expenses of keeping, unless the owner shall appear and settle the same within 6 days. So where cattle are at large contrary to village or town regulations, the ordinary proceeding is to put them in a pound, and after a certain time to sell them for the payment of the penalty and charges.

ESTREAT (Lat. *extractum;* Fr. *estrete*), a term still in use in criminal proceedings, by which is signified the extracting or taking out a record of a court for the purpose of being prosecuted in another court, or it may be in the same court. To estreat a recognizance is to endorse it by order of the court for prosecution. The use of the term probably grew out of the custom in England of sending all recognizances to the court of exchequer to be prosecuted.

ESTRÉES, Gabrielle d', mistress of Henry IV. of France, born in 1571, died April 10, 1599. In 1590 she met Henry for the first time at the chateau of Cœuvres, where she resided with her family. She was fair and of singularly delicate complexion; her eyes were blue, and combined in a remarkable degree tenderness with brilliancy of expression; her hair had a golden hue, her forehead was bold and large, her whole presence was beaming with intelligence and instinct with gentleness and grace. She inspired the French monarch with a violent passion, which, however, did not interrupt her relation with her old lover, the duke of Bellegarde. The king caused her to take M. de Liancourt for her nominal husband, and subsequently raised her to the rank of marchioness of Monceaux, and in 1595 to that of duchess of Beaufort. At the same time he lavished riches upon her in great profusion, and at the time of her death she was the owner of more than 12 estates, some of which are to this day pointed out in the vicinity of Paris. The extravagance of frivolous ladies of our days dwindles into insignificance compared to the fabulous display of Gabrielle on all public occasions. Henry would have divorced himself (as he afterward did) from Margaret of Valois, his legitimate wife, for the purpose of raising Gabrielle to the throne of France, if it had not been for his minister and friend Sully, who was the only person with whose influence she was unable to cope. She had 3 children by the king, 2 sons and a daughter.

ESTREMADURA, a province of Portugal, on the W. side of the kingdom, between Douro, Beira, Alemtejo, and the Atlantic ocean; area, 7,256 sq. m.; pop. 806,000. It contains the cities of Lisbon and Leiria. Its soil is watered and fertilized by numerous streams, the principal of which are the Tagus and the Soldao. Grains, fruits, and wines are produced. It has suffered from earthquakes, and has unexplored mines.

ESTREMADURA, an old province of Spain, in the W. part of the peninsula, comprising the modern provinces of Badajoz and Caceres, bounded N. by the province of Salamanca, E. by those of Toledo, Ciudad Real, and Cordova, S. by those of Seville and Huelva, and W. by Portugal; area, 14,742 sq. m.; pop. 601,124. It is entirely surrounded by mountains, and is divided naturally into 3 parts by the rivers Tagus and Guadiana, and into 2 parts by the mountains of Guadalupe, San Pedro, and San Mamed. These mountains, forming but a single chain, traverse the province from E. to W., and form the boundary between its two present divisions. The soil of Estremadura is very fertile, and if well cultivated would produce sufficient to support a third of the population of Spain; but nearly all the large proprietors reserve their lands for the pasturing of their flocks, so that the agricultural products are few. A little barley and wheat are cultivated, and chestnuts are abundant, and are the principal food of the inhabitants. This province is distant from the sea, and has no great highways. Even its rivers are little used for navigation. Its manufactures are of no importance, and it has neglected mines of lead, silver, and coal. It was formerly a part of the kingdom of Leon, and was the last province conquered by Alfonso IX. of that kingdom; whence the name of Estremadura, from *extrema ora*, last region.

ESZEK, Essegk, or Esseg (Hun. *Eszék*), a town and fortress of Austria, capital of Slavonia, and of a circle of its own name, on the river Drave, 13 m. from its confluence with the Danube; pop. 12,600. It is the centre of the commerce and industry of Slavonia. Fairs for cattle, corn, and other produce are held here 4 times a year. The Drave has been made available for steamboat navigation within the last few years. There are 1 Catholic and 3 Greek churches, and other public institutions and buildings. The fortress contains an arsenal and barracks for 30,000 men. During the revolutionary period of 1848–'49, the fortress was occupied by the Hungarians until Feb. 14, 1849, when it surrendered to the

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Austrian Gen. Trebersberg. Not far from Eszek stand the famous bridges constructed by Solyman in 1566, to facilitate the entrance of the Turkish armies into Hungary. The town was a colony of the Romans, who called it Mursia.

ÉTAMPES (anc. *Stampæ*), an ancient French town in the department of Seine-et-Oise, 34 m. by rail from Paris; pop. in 1856, 7,947. It is situated on 2 small tributaries of the Juine, or Étampes, in a fertile valley, and is surrounded with shady promenades. Near the railway station to Paris is a ruined tower called Guinette, the only remnant of the ancient castle built by King Robert in the 11th century. There are several fine churches, a town hall, and a castle which is said to have been given in appanage to the duchess d'Étampes and other royal favorites. The chief manufactures are soap, leather, counterpanes, woollen yarn, and hosiery. There is a considerable trade in wool, corn, honey, and flour, and more than 40 mills.

ÉTAMPES, ANNE DE PISSELEU, duchess d', a mistress of Francis I. of France, born in 1508, died about 1576. Her father, Guillaume de Pisseleu, was a country gentleman of Picardy, who was married 3 times, and had no fewer than 30 children. Anne was a maid of honor of the queen regent, when she attracted the attention of her son Francis I. She became his favorite mistress, displacing the countess de Chateaubriant; but to save appearances he gave her for a nominal husband Jean de Brosse, afterward duke d'Étampes. The new duchess secured lucrative appointments to her relatives and friends, and wielded a paramount influence in the affairs of the nation. Upon the fine arts and in some other directions she exerted a good influence, but the jealousy which sprung up between her and Diana of Poitiers, the mistress of the dauphin Henry, eventually became a source of calamity for her lover and for France. It was chiefly under the influence of this feeling that she betrayed to Charles V. the movements of the French army; and the disadvantageous treaty of Crécy in 1544 was due to the intrigues of Anne and of Diana. Anne was present in 1538 at the interview between Francis I. and Charles V., and, according to the gossiping chroniclers of the times, even the stern emperor was fascinated by her beauty. The death of Francis (1547) proved fatal to her power. Henry II. banished her from the court, and she ended her days on one of her estates. It is said that she here devoted herself to religion, and that she became a convert to Protestantism.

ETAWAH, a district of British India, in the lieutenant-governorship of the N. W. provinces, bounded N. by Minpooree and Furruckabad, E. by Cawnpore, S. by Bundelcund, S. W. by Gwalior, and W. by Agra; area, 1,674 sq. m.; pop. in 1853, 610,965, of whom 578,158 were Hindoos. It lies chiefly in the Doab between the Jumna and Ganges, but comprises also a narrow tract on the right or S. W. bank of the former river. The climate from October to March is delightful, and fires are needed at night; but in the spring, from the unsheltered character of the country, the hot winds blow with a fury unsurpassed in any part of India. They are succeeded by a wet season, in which the rain falls in torrents. The principal crops are indigo, cotton, opium, sugar cane, rice, wheat, barley, various European vegetables, and fruits. Timber is very scarce. The district was formerly noted as the haunt of numerous bodies of Thugs, who infested both sides of the Jumna, and were not unfrequently protected by the native landowners. To so great an extent did the system of thuggee prevail, that in one year (1808) 67 dead bodies were taken out of wells in this district. Etawah was acquired by the British in 1801 in lieu of a subsidy claimed from the nabob of Oude. It was formerly united with Cawnpore, but in 1840 was erected into a separate zillah.—ETAWAH, the principal town of the above district, is situated on high ground about 1 m. from the left bank of the Jumna, 100 m. N. W. of Cawnpore, and 73 m. S. E. of Agra; pop. 23,300. Ghats, or flights of steps, some in ruins, others new and frequented by Hindoo devotees for the purpose of religious ablutions, lead toward the river, across which is a ferry and at times a bridge of boats. A fort and a large gaol are the principal buildings. The town was a prosperous and important place under the Mogul empire, but is now little more than a mass of ruins, and is generally described as one of the least attractive stations in India. It owes some commercial consequence to its position at the junction of the roads from Calpee and Cawnpore to Agra, and has a few bungalows and other military buildings. A detachment of the 9th regiment Bengal native infantry mutinied here in the latter part of May, 1857.

ETCHING. See ENGRAVING.

ETEOCLES AND POLYNICES, mythical kings of Grecian Thebes, sons of Œdipus and Jocaste. After the flight of their father, the brothers agreed to govern the kingdom alternately; but Eteocles refusing, on the expiration of his term, to surrender the sceptre, Polynices retired to the court of Adrastus, king of Argos, who gave him one of his daughters in marriage, and undertook to sustain him in the enforcement of his rights. Organizing accordingly that confederacy of Peloponnesian chiefs, whose exploits Æschylus has immortalized, Adrastus with his son-in-law marched against Thebes. The success of the belligerents was various, and many warriors were slain, when the brothers, to prevent the further effusion of blood, resolved to decide the contest by single combat, in which both perished.

ETESIAN WINDS (Gr. ἐτησιαι, from ἐτος, year), the name given by the ancients to the N. E. trade winds which blow for about 6 weeks during the summer throughout the countries adjacent to the Mediterranean, especially its eastern portion. On the sea they are called by the fishermen *meltem*, probably from *mal tempo*, in reference to the fury with which they

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blow, and the dangerous weather they create for their small craft. On land they are more favorably regarded, Cicero remarking of them that in Italy they are equally comfortable and salutary to men, beasts, and birds, and likewise beneficial to vegetation, by moderating the violent heat of the weather during the season of the dog days. Pliny and Seneca also make mention of them. In the Levant they commence toward the middle of July about 9 in the morning, continuing only in the daytime. The sun at that season is powerfully heating the surface under the tropic of Cancer, and rarefying the atmosphere south of the Mediterranean. Currents of air are thus drawn in over the desert of Sahara; but though in their passage across the Mediterranean they must become charged with moisture, the clouds are dispersed as they pass the margin of the hot sands, and the vapor dissipated in the rarefied air is swept on, to be again collected together and precipitated in a cooler region.

ETHELBALD, king of Wessex, son of Ethelwulf, king of the Anglo-Saxons, obtained the throne of Wessex in 856, died in 860. While Ethelwulf was making a journey to Rome, on his way back from which he married Judith, the young daughter of the French monarch, Ethelbald formed the project of seizing the throne. A civil war was prevented only by the moderation of Ethelwulf, who resigned to his son the dominion of Wessex, and confirmed that portion of the kingdom to him in his will. The reign of Ethelbald was peaceful, but he excited general disapprobation by marrying, contrary to the canonical law, his stepmother Judith. Ecclesiastical and popular displeasure forced him at length to a separation, and Judith returning to France eloped from a convent with Baldwin, afterward count of Flanders. From this union descended Matilda, wife of William the Conqueror, and through her the race of English sovereigns.

ETHELBERT, king of Kent, and 3d bretwalda or chief of the Anglo-Saxon heptarchy, born about 545, ascended the throne in 560, died in 616. As the representative of Hengist, he claimed superiority among the Saxon states, but was twice discomfited in battle in the early part of his reign by Ceawlin, the powerful king of Wessex. About 589, however, he had acquired the dignity of bretwalda, Ceawlin being deposed, and dying a few years later. The most remarkable event of his reign was the introduction of the Christian religion into Britain. His queen Bertha, a daughter of Charibert, king of Paris, professed this faith, and her virtues and popularity recommended it both to the king and the people. Nor could it be unknown to the English Saxons that Christianity had already become the religion of their brethren who had descended as conquerors toward the south of Europe. In 596, 40 Italian and French monks, sent by Gregory the Great, under the conduct of Augustin, landed on the isle of Thanet. They were received by the king beneath an oak, the sacred tree of the druids, where it was supposed any magical spell would be without influence; and after a conference he gave them permission to preach without molestation, though he himself had no inclination to abandon the gods of his fathers. The queen prepared a residence for the new apostles, and in 597 Ethelbert received the sacrament of baptism, and his example was followed by 10,000 of his subjects. About 600 he issued the earliest remaining code of Anglo-Saxon laws, consisting of 89 enactments, relating principally to the amount of pecuniary fines payable for various transgressions.

ETHELBERT, 3d king of the Anglo-Saxons, son and successor of Ethelwulf, died in 865. He inherited, in 857, the government of all the kingdom, excepting Wessex, and upon the death of his brother Ethelbald in 860 possessed himself also of that portion. His reign was molested by the invasions of the Northmen, who sacked the city of Winchester, landed on the isle of Thanet, pillaged a part of Kent, and made their appearance in Northumbria under Ragner Lodbrog.

ETHELRED (also written EDELRED and ETHERED) I., 4th king of the Anglo-Saxons, son of Ethelwulf, and successor of Ethelbert, ascended the throne in 866, died in 871. His reign was a continuous struggle against the Northmen. The sons of the Danish chieftain Ragnar, whom the Northumbrians had put to death, appeared in East Anglia, afterward took possession of the city of York, and defeated and slew two Northumbrian princes who attempted to recover it. Marching S. they took up their winter quarters at Nottingham, whence they retired without a battle after being for some time beleaguered by Ethelred and his brother Alfred. Passing into East Anglia, they burnt on their way the monasteries of Bardney, Croyland, and Medeshamstede, ravaged the nunnery of Ely, and seized and murdered the East Anglian king Edmund, who was hence revered as a martyr by his subjects and their posterity. They were met in 871 by Ethelred and Alfred at Reading, but were able to maintain their ground. Being, however, 4 days later, at Escesdune, attacked with great impetuosity by Alfred, they were routed and were pursued for a night and a day. Within a fortnight another battle was fought at Basing in which the invaders were victorious, and an obstinate engagement soon followed at Merton. Ethelred died of a wound, and left to Alfred the inheritance of his cares.

ETHELRED II., surnamed the Unready, king of the Anglo-Saxons, son of Edgar, successor of Edward the Martyr, born in 968, ascended the throne in 978, died in London, April 23, 1016. His reign was long, and the most unfortunate in Anglo-Saxon history. The son of that Elfrida whose criminal ambition had caused the tragic death of the late king, he never possessed the affections of his subjects, and was acknowledged king only because there was no other prince of the royal blood. The Northmen made

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several invasions, appeared with a formidable armament in 991 off the coast of Essex, and were met at Maldon by Brithnoth, earldorman of that country, who after having foiled their efforts for 14 days was defeated and slain. The king, listening to the advice of Siric, archbishop of Canterbury, and of many of the degenerate nobility, purchased the departure of the enemy from the kingdom by paying them 10,000 pounds of silver. A fleet fitted out against them was rendered useless by the treachery of Elfric. In 993 the Danes were joined by 3 chieftains who were sent to oppose them, and then captured the castle of Bamborough and ravaged both sides of the Humber. In 994 the Northmen, under the command of Sweyn, king of Denmark, and Olave, king of Norway, dared to attack the centre of the kingdom, sailed up the Thames, laid siege to London, from which being repulsed, they plundered Essex, Sussex, and Hampshire, and having obtained horses were spreading devastation far into the inland counties. The forbearance of the invaders was now purchased by the payment of 16,000 pounds, and in 1001 of 24,000 pounds of silver. Ethelred and his advisers then determined to rid themselves of the Danes by a general massacre of all of them who were remaining in the kingdom. Secret orders were sent to every town and county, and on Nov. 13, 1002, the festival of St. Brice, multitudes of every age and sex were butchered. Next year Sweyn reappeared on the south coast, and from this time left the kingdom no rest. He devastated all the country from Exeter to the heart of Wiltshire, burning cities and villages. He consented to a peace in 1007 on payment of 36,000 pounds. Soon the war began again, and was again momentarily ended in 1012 by the payment of 48,000 pounds. In 1013 Sweyn openly declared his purpose of conquering England, and having landed at Gainsborough marched triumphantly from Northumbria to the walls of London. Repulsed from the capital, he marched to Bath, where he was proclaimed king of England, and recognized by the thanes of Wessex, Mercia, and Northumbria. This general defection alarmed Ethelred, and he fled in haste to Normandy and found an asylum with his brother-in-law the Norman king. The death of Sweyn, 2 or 3 weeks later, recalled the fugitive monarch, who inflicted cruelties upon the Danish population which were revenged by Canute the Danish successor. The young prince Edmund, afterward called "Ironside," defended the throne during the last years of Ethelred.

ETHELWULF, 2d king of the Anglo-Saxons, son and successor of Egbert, ascended the throne in 836, died in 857 or 858. Without the vigor of his father, and fitted rather to wear the cowl than wield the sceptre, he began his reign by transferring the provinces of Kent, Essex, and Sussex to the government of his eldest son Athelstan. For many years he was occupied only with incessant contests with the Northmen who annually made inroads into England, and though repulsed and defeated, always carried off booty. In 850–'51, a part of them dared for the first time to pass the winter in England. Strongly reënforced in the spring, they sailed up the Thames, sacked Canterbury and London, and met Ethelwulf at the head of the West Saxons at Okely. After an obstinate battle the Danes were defeated with a loss greater, it is said, than they had ever before suffered, and other divisions of their forces were defeated by Ceorle in Devonshire, and by Athelstan at sea. Yet they maintained their settlement on the isle of Thanet, but were cautious in their ravages during the remainder of Ethelwulf's reign. In 855 the king made a visit to Rome, accompanied by his son Alfred, who there received from the pontiff the regal unction and the sacrament of confirmation. He returned through France, where he tarried to marry Judith, the daughter of the French king. His son Athelstan meantime had died, and Ethelbald was usurping the kingdom, when he returned and yielded to the latter the government of Wessex. He survived this partition of his dominions but 2 years, which he passed in acts of charity and devotion.

ETHER (Gr. *αἰθηρ*, the upper air), in chemistry, the name given to a class of highly volatile, inflammable, spirituous liquids, possessing a sweetish taste and peculiar fragrance, obtained commonly by distilling alcohol in mixture with some acid. Their composition is somewhat variable according to the acid employed in their preparation, and this gives them their distinctive names, as sulphuric ether, nitric ether, &c. Yet these acids do not in all cases furnish any of the ingredients of the ether, and the same ether may sometimes be produced by the action of other substances upon alcohol, as well as of the acid usually employed. This is especially the case with sulphuric ether, and as it contains no sulphuric acid, and is by far the most common form of ether, it is now admitted into the U. S. and London pharmacopœias by the name of æther, as it was before known in common use. This ether, it is supposed, was known to Raymond Lully, who lived in the 13th century. Valerius Cordus in 1540 described the method of making it. Dr. Frobenius in 1730 first brought it prominently forward in a paper published in the "Philosophical Transactions;" and by a note appended to this, it appears that Boyle and Newton had both directed their attention to it.—The preparation of ether was formerly conducted by distilling in a glass retort a mixture of equal parts of sulphuric acid and alcohol at a moderate heat, and when about one-third of the whole had come over, adding half as much alcohol as before, and again distilling. But a better method is to conduct the process upon a larger scale with the use of a leaden still heated by high steam passed through in a spiral pipe; and the alcohol is best introduced in small quantities at a time by a pipe which passes through the upper part of the still. Such

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is the apparatus used at the apothecaries' hall, London. The heating by steam obviates the danger of explosion, to which the process is liable when the vapors that escape come in contact with the flame of a fire or of a lamp. The apparatus given by Brande is a convenient one either on a large or small scale. In a glass flask are introduced 8 parts by weight of concentrated sulphuric acid and 5 parts of spirit of wine of specific gravity 0.834. This is set in a small sand bath, which may be conveniently heated by a gas light. A thermometer graduated at least to 320° F. passes through the cork, the bulb being in the liquid. There is also a tube reaching to the bottom, and expanding at top into a funnel. This is intended to receive more alcohol slowly dropped into it as the process goes on. A glass tube of large bore conveys the vapor through the condenser, which is surrounded with cold water, and the liquid drops from the end of the tube into a proper receiver. By keeping the temperature as nearly as possible to 300°, the ebullition goes on rapidly, and the quantity of liquid in the flask may be kept nearly the same for several hours, the alcohol as fast as it is admitted being converted into the vapor of ether and of water. These condense together, but in the receiving vessel they separate, the water sinking to the bottom together with $\frac{1}{10}$ of its volume of ether dissolved in it. If a weak acid be used or too much alcohol, so that the boiling point of the mixture is reduced below 260°, the alcohol is apt to pass over unchanged. It is important to keep up a rapid, or even violent boiling, at a temperature between 260° and 310°. At about 320° olefiant gas and other undesirable products are generated. By the continuous process of Dr. Brande, a small quantity of sulphuric acid may be made to convert into ether a large quantity of alcohol. It might serve for an indefinite time but for its slow volatilization and the passing over of its vapor with the others. Ether is purified by shaking it in a close vessel with twice its bulk of water. After standing, the ether is poured off, and the water that may be still present is taken up by mixing quick lime with it. Then by distilling, pure ether is obtained.—Ether is remarkable for its great volatility. Its vapor escapes in pouring the fluid from one vessel into another, so that if a lighted candle is near there is danger of the whole being suddenly inflamed. A mixture of 10 volumes of oxygen and one of ether vapor explodes violently by an electric spark. The vapor is so much more dense than air, being as 2.58 to 1, that it can be poured out of one vessel into another, displacing the air in this, and showing its presence by taking fire on the application of a match. Its rapid evaporation produces intense cold; a few drops being made to cover a drop of water and then blown upon through a tube, the water is frozen directly. Ether itself, however, does not freeze, even at 166° below zero. Its boiling point varies with the nature of the vessel containing it; at the ordinary pressure it boils at 96.5°. Its specific gravity at 68° is 0.713. It has neither an acid nor alkaline reaction; but after being exposed to the air and light, a little acetic acid is formed in it. Ether unites with alcohol in all proportions. It takes up $\frac{1}{10}$ of its volume of water, and water does the same of ether. If water dissolve more than this, the ether may be suspected of being adulterated with water and alcohol. The ultimate constituents of sulphuric ether are carbon 4 equivalents, hydrogen 5, and oxygen 1, or $C_4 H_5 O$, differing from those of alcohol ($C_4 H_6 O_2$) by H O, or one atom less of water. The radical ethyle consists of $C_4 H_5$, and ether is regarded as its oxide, alcohol as its hydrated oxide. Ether is much employed in medical practice as a narcotic, antispasmodic, and stimulant; a teaspoonful of it in a glass of white wine is recommended by Dr. Brande as a remedy in sea-sickness. It is a specific in nervous headaches, and in burns and scalds is applied as a refrigerant. Its most important use, however, has been to produce insensibility to pain by its inhalation when diluted with air. (See ANÆSTHETIC AGENTS.) Several of the ethers exist in a natural state in the fruits, giving to them their peculiar flavors; and the alcoholic liquors distilled from these fruits retain these principles in combination with some acid. Thus œnanthic ether combined with œnanthic acid forms the oil which contains the fragrance of brandy and some other spirits. Whiskey is thought by Dr. Frankland to owe its flavor to the oily liquid called pelargonic ether; and according to Gregory, this is now manufactured by a secret process, and sold at a high price to impart to new whiskey the flavor of old.

ETHEREGE, or ETHERIDGE, SIR GEORGE, an English comic author, born in 1636, died about 1694. He studied at the university of Cambridge, travelled upon the continent, abandoned the study of law for the culture of letters, and became known as one of the wits and libertines of the reign of Charles II. His comedies entitled the "Comical Revenge, or Love in a Tub," "She Would if She Could," and the "Man of Mode, or Sir Fopling Flutter," are marked by a sprightlier and wittier dialogue than had before been displayed in the English comic drama. The author was an associate of Buckingham, Rochester, and other gay courtiers and pleasure seekers of the time, and he introduced upon the stage the manners and characters with which he was familiar. He also wrote a few coarse songs and lampoons. He lived licentiously, wasted his fortune, and died by falling down stairs after a debauch.

ETHICS. See MORAL PHILOSOPHY.

ETHIOPIA (Gr. αἴθω, to burn, and ὄψ, countenance), in ancient geography, the name originally given by the Greeks to the southern parts of the known world. It is divided in the poems of Homer into eastern and western Ethiopia, and this distinction is repeated by Herodotus, and by the later Greek and Roman geographers. Eastern Ethiopia appears to have

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included southern India, whose inhabitants were called Ethiopians from their color. There were also other Asiatic Ethiopians, an equestrian race, of a darker color than their neighbors, who wore crests made of the hides and manes of horses, and are supposed to have been a Mongolian tribe which had wandered into the steppes of Koordistan. The name Ethiopia was more usually and definitely applied to the country south of Libya and Egypt, between the Red sea on the east and the desert of Sahara on the west, and embracing the modern regions of Nubia, Sennaar, Kordofan, and Abyssinia. In a still narrower sense, the designation was restricted to the province or kingdom of Meroë, which was also called the civilized Ethiopia. African Ethiopia, which is called in the Bible the land of Cush, embraced, according to Pliny, 45 distinct kingdoms; yet as neither the Greeks nor Romans ever penetrated beyond Napata, in lat. 19° N., we are indebted for most accounts of it to Greek imagination. Meroë, between the Nile and the Astaboras, formed the most powerful state, and had a theocratic constitution. The other principal divisions were the Blemmyes, whose aspect was hideous; the Troglodytæ, who lived in caverns; the Macrobii, or long-lived men; the Ichthyophagi, or fish eaters; and the Creophagi, Chelonophagi, Elephantophagi, Struthophagi, and Ophiophagi, respectively the eaters of flesh, tortoises, elephants, ostriches, and serpents. Fable placed also in this region the race of pygmies. Some parts of Ethiopia were named from their productions, as the land of cinnamon, and of myrrh, and the Jews and Phœnicians went thither to obtain aromatics and ivory. The Ethiopian kings seem to have been chosen from among the priests, and the order of succession gave the crown to the nephew of the king, the son of his sister; and in default of an heir, an election was made. The people practised circumcision, and embalmed their dead in a manner similar to that of the Egyptians. They were of an intrepid, impetuous, and violent character, and yet are represented as loving and practising justice. Homer makes Jupiter visit them, and sit at their feasts. There were many Ethiopian queens named Candace, one of whom became subject to the emperor Augustus. Under the Romans the population of Ethiopia became almost wholly Arabian, and so continued after the introduction of Christianity in the 4th century. When the followers of Mohammed overran the entire region some centuries later, the Arabic element gained complete predominance in it. During the middle ages the Christians and clergy of Abyssinia were designated as the Ethiopian church.

ETHIOPIAN LANGUAGE AND LITERATURE. Of the different dialects spoken in modern Abyssinia, the Amharic and the Tigré are the most remarkable. The former of these shows little affinity with the ancient language of the country, the Geez, or the Ethiopic properly so called, which since the beginning of the 14th century, when a dynastic change made the Amharic the language of the court, has ceased to be the vernacular, and is used only by people of education and learning, in religious and civil documents. This ancient language, which has its name from the inhabitants calling it *lesana geez*, that is, language of science, as it is also called language of books, is of Semitic origin, resembling in roots, structure, and grammatical forms, the ancient South Arabian dialect of the Himyarites, which since Mohammed has disappeared from the peninsula. This favors the hypothesis of some historians, who suppose the Ethiopians to have been a colony from Arabia. The alphabet also of the Geez greatly resembles that of the Himyarites, as found in their remaining inscriptions. It consists of 26 consonants and 7 vowels, which are small marks inseparably connected with the former, thus forming a peculiar syllabic mode of writing, analogous to the Devanagari and some other Indian alphabets. Few of these letters show a resemblance to the Phœnician alphabet, while 24 of them may be traced in the Arabic. There are no diacritical marks; the single words are separated by 2 dots; the accent is difficult; the mode of writing is from left to right, the reverse having been the practice before the introduction of Christianity into Abyssinia. In roots, and forms of expression and construction, the Geez is poorer than the Arabic. According to Gesenius, one-third of all the roots can be traced distinctly in the Arabic, and many other words may be presumed to be of the same origin, while the roots of others can be found in the Hebrew, Syriac, or Chaldaic, some being native African, a few of Greek, scarcely any of Coptic derivation. The Geez has 10 conjugations, 8 of which answer to those of the Arabic, the 5th and the 6th being peculiar. A double infinitive is used substantively, this mood having both an absolute and constructive form. There is no participle. The dual is unknown both in verbs and nouns; the difference of masculine and feminine is observed throughout in the 2d and 3d persons. The relation of the genitive is expressed by an inflection, causing some changes in the terminations, or through the relative pronoun; the dative by prepositions; the comparative and superlative degrees by particles. The plural is formed by affixed syllables, *ân* in masculine, *ât* in feminine nouns, on the principle common to the Hebrew, Arabic, and Aramaic, or by changes in the radical letters, after the manner of the so-called broken plural in Arabic. In the formation of nouns the Geez most resembles the Hebrew, but it has superfluous final vowels, modified in certain cases, in which it is analogous to the Arabic in its nunnation. Beside a few fragments in inscriptions, there are no remnants of the ancient Ethiopian literature of a period preceding the introduction of Christianity under Constantine the Great, but of works composed since that time about 200 are known to European scholars. The Old Testament, translated from the Septuagint by

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unknown Christian writers in the 4th century, is extant in manuscripts in Europe, but only a part of it has been printed. The Psalms were published in Ethiopic and Latin by Ludolf (Frankfort on the Main, 1701), and in Ethiopic alone (London, 1815). The version of the New Testament appeared at Rome in 1548, and in the London polyglot Bible. Of versions of apocryphal books, in which the Ethiopic is particularly rich, several have been published, as the "Book of Enoch," translated by Richard Laurence into English (2d edition, London, 1833), and by Hoffmann into German (Jena, 1838), in *Vatia*, translated by Laurence into Latin, and published in both languages (Oxford, 1819). Geez in 1840 (London), and *Ascensio Isaiæ*. The "Didascalia, or Apostolical Constitution of the Abyssinian Church," was published in Ethiopic and English by Platt (London, 1834). The *Synaxar* contains lives of Abyssinian saints, martyrologies, and the hymns of the Ethiopian church, in rude rhythmical form, every 3 or 5 lines often ending in the same consonant, which forms a kind of rhyme. The profane literature of the Ethiopian language is comparatively poor, consisting chiefly of chronicles, which appear to be of considerable interest, but have not yet been generally accessible. Of these the most remarkable are the *Keber za Nageste*, containing the traditional and legendary history of the once mighty kingdom of Axoom, a copy of which was brought to Europe by Bruce, and a translation of it appended to his travels; and the *Tarek Nagushti*, or chronicle of kings. In Europe the Ethiopian language was almost unknown until the time of Job Ludolf, who, being assisted by an excellent native scholar, Abbas Gregorius, made himself master of it, and published an admirable dictionary and grammar (2d improved and enlarged edition, Frankfort, 1702). After a long interval the interest in this language and literature has been revived by the works of Platt, Laurence, Gesenius, Hupfeld, Hoffmann, Rödiger, Ewald, and others, as well as by the contributions of Isenberg, Blumberg, and D'Abbadie.

ETHNOLOGY (Gr. ἔθνος, nation, and λογος, doctrine), the science which treats of the relations of the different races or divisions of man to each other, as distinguished from anthropology, which considers the relations of man to other members of the animal kingdom. These two distinct sciences make up the natural history of man. Ethnology has been made synonymous with the natural and the physical history of man, both of which strictly embrace more or less of anthropology. While the latter would require only a single pair of human beings for its study, ethnology presupposes variety of races, and the greater the variety the further do its boundaries extend. Some authors confine the term to the speculative portion of the subject, calling the descriptive part of the science ethnography. In a science so new as this, absolute precision in terms cannot be expected. As anthropology has been treated under its own title, this article will be limited to ethnology proper. History traces the moral influences of races upon each other, but ethnology treats of the effects of physical agencies upon man, going back long anterior to written records, and, unlike history, argues from effects to causes, from the known to the unknown. Prichard defines it as the archæology of the human inhabitants of the globe. The ethnologist should not only be a naturalist, but should be familiar with philology or the science of languages, archæology or the study of human monuments and remains, and physical geography as far as it relates to climatological and kindred influences on the races. It may well be conceived then, from the difficulties inherent in the subject, and from the rarity with which the necessary qualifications exist in observers, that the science of ethnology is at present in a very unsatisfactory though progressive condition. The ancient writers have contributed very little to ethnology. Among the Greeks, Herodotus and Xenophon give a faint idea of the ancient populations; among the Latins, Sallust, Cæsar, and especially Tacitus, have supplied fuller information, yet so unimportant compared to what they might have done, that Latham well remarks, in reference to the Getæ and Thracians: "The commonest slave dealer of Byzantium or Olbiopolis could have told us more than all the learned men ever employed on such subjects." It is only in comparatively modern times, since the discovery of America, the circumnavigation of the globe, and the explorations of Asia, Africa, and the Pacific islands, that ethnology can be said to have begun to accumulate the materials necessary for a natural classification of the human races. The great problems connected with ethnology are the unity and diversity, the geographical origin or origins, the antiquity, and the future destiny of races; subjects so vast in themselves that they can only be incidentally alluded to here. The question of most exciting interest in regard to the human races at the present day is that of unity and diversity, which is not only interesting to the scientific man, but has been made a stumbling block in the way of philanthropy and theology. Ethnologists have divided themselves into two great schools on this point, of one of which Prichard may be considered the ablest advocate, and of the other Agassiz; the recent advances made in zoology, comparative anatomy, history, geography, philology, and in the interpretation of the Scriptures, have furnished materials for the earnest discussion and support of each side of the question.—The classifications of the races of man have been founded principally upon the complexion, nature of the hair, shape of the skull, conformation of the pelvis, and character of the languages, either alone or in combination. Linnæus, in the first edition of his *Systema Naturæ*, makes 4 divisions of the genus *homo*, founded upon the color of the skin, viz.: 1, European, whitish; 2, American, coppery; 3, Asiatic, tawny; and 4, African, black. The divisions proposed by Buf-

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fon were 5: the Hyperborean (including the inhabitants of the polar regions and of eastern and central Asia, or Laplanders and Tartars), Southern Asiatic, European, Ethiopian, and American. Blumenbach adopted these, changing the names of some of the divisions, and more accurately defining their geographical distribution. The classification of Blumenbach, fully given in the article ANTHROPOLOGY, divides mankind into the 5 classes of Caucasian, Mongolian, Ethiopian, American, and Malay, and is founded on the combined characters of the complexion, hair, and skull. This classification is followed by Lawrence in his "Lectures on the Natural History of Man;" this writer was among the first to hint at the possible diversity of origin of the races. Before Blumenbach, Camper, a Dutch anatomist, attempted to classify the races by the shape of the skull, and his measurements, constituting the facial angle, are still of considerable value to the ethnologist and anthropologist. He says: "The basis on which the distinction of nations is founded may be displayed by two straight lines, one of which is to be drawn through the meatus auditorius or opening of the ear to the base of the nose, and the other touching the prominent centre of the forehead, and falling thence on the most advancing part of the upper jaw bone, the head being viewed in profile." This gives the facial angle; and the occipital angle may be measured in a similar manner. The objections to this mode of measurement are the varying thickness of the skull, development of the facial cavities, and projection of the front teeth, and its application to only one part of the skull; the method of Cuvier is better, which compares the areas of the cranium and face sawed vertically on the median line from before backward; according to this measurement the area of the former in the highest races is 4 times that of the face, in the negro the area of the face being ½ larger. The *norma verticalis* of Blumenbach measures the breadth of the skull and the projection of the face, and consists in viewing skulls from behind and above, the eye being fixed on the vertex of each; the direction of the maxillary and malar bones, the breadth of the oval contour of the head, the form of the frontal bones, and other characters considered as national, are presented in this view. The comparisons of skulls made by Dr. Morton in his ethnological works are based on the cubic contents of each cranium, measured by noting the quantity which they will hold of any small granular substance. The examination of the base of the skull, as suggested by Owen, so valuable in anthropology, is of little importance in ethnology.—Cuvier divides mankind into 3 stocks: 1, Caucasian, with the branches Armenian, Indian, and Scythian, or Tartar; 2, Mongol or Altaic, with the branches Calmucks, Kalkas, Mantchoos, Japanese, and Siberians; 3, Negro or Ethiopian. He is undecided as to the position of the Malays, Alfooroos, and Papuans, and is inclined to refer the American Indians to the Mongol stock. He adopts the ill-chosen term "Caucasian" from Blumenbach, which has now become both incorrect and inconvenient; the term originated from the prevalent belief at that time that the white races had their cradle in the mountains of Caucasus, and from the fact that some of the finest known specimens of man (the Circassians and Georgians) inhabit that region; as there is no foundation in truth for such a belief, the name has been given up by many modern writers. Fischer, in his *Synopsis Mammalium*, divides man into *homo Japeticus*, with the branches *Caucasicus*, *Arabicus*, and *Indicus*; *H. Neptunianus*, with the branches *Occidentalis* and *Papuensis* (the Malay race); *H. Scythicus* (Calmucks and Mongols), with the branches *Sinicus* and *Hyperboreus*; *H. Americanus* (South American indigenes), with the branch *Patagonus*; *H. Columbicus*, the indigenes of North America, eastern Mexico, the Antilles, &c.; *H. Æthiopicus*, with the branches *Caffer*, *Melanoides* (Papuans, Feejeeans, &c.), and *Hottentottus*; and *H. Polynesius*, the Alfooroos, Australians, &c. Lesson, in his *Mammalogie*, divides the races, according to complexion, into the white or Caucasian, the yellow or Mongol, and the black or negro stocks. His later arrangement in his *Spécies des mammifères* is the following: 1, the white race; 2, the bistre black or dusky race, including Hindoos, Caffres, Papuans, and Australians; 3, the orange-colored, or Malay race; 4, the yellow race, including the Mongolians, Oceanic and South American branches; 5, the red, the North American and Carib races; 6, the black race, including the African and Asiatic negroes, Nigritians, Tasmanians, Hottentots, and Bushmen. The divisions of Duméril are: the Caucasian or Arab-European, Hyperborean, Mongolian, American, Malay, and Ethiopian. Virey makes 2 species of the genus *homo*: the first with a facial angle of 85° to 90°, including the white Caucasian race, the yellow Mongolian, and the copper-colored American; the second with a facial angle of 75° to 82°, including the dark brown Malay, the black or negro race, and the blackish Hottentots and Papuans. The sections of Desmoulins are: Celto-Scyth-Arabs, Mongols, Ethiopians, Euro-Africans, Austro-Africans, Malays or Oceanians, Papous, negro Oceanians, Australasians, Columbians, and Americans. Bory de St. Vincent amplifies considerably the divisions of Desmoulins, making 15 stocks in 3 classes, as follows: I. Races with smooth straight hair, peculiar to the old world, including: 1, the Japetic stock (named from Japetus, whom the ancients regarded as the progenitor of the race inhabiting the West, *audax Japeti genus*, the original seat of which is the mountain chains nearly parallel to lat. 45° N.), the Caucasian, Pelasgic, Celtic, and Germanic races; 2, the Arabian stock, including the ancient Egyptians, North Africans, and Adamiè or Syrian races; 3, the Hindoo stock; 4, the Scythic stock, or Tartars; 5, the Chinese stock; 6, the Hyperborean stock (Lap-

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landers, &c.); 7, the Neptunian stock, including the Malays, Oceanic and Papuan races; 8, the Australasian stock. II. Races of the new world with straight hair, including: 9, the Columbian stock, the North American races; 10, the American stock, the South American races; 11, the Patagonian stock. III. Crisp-haired or negro races, including: 12, the Ethiopian stock, or black races of central Africa; 13, the Caffre stock; 14, the Melanian stock, or races of Madagascar, New Guinea, Feejee islands, Van Diemen's Land, &c.; and 15, the Hottentot stock. Prof. Broc, in his *Essai sur les races humaines* (1836), adds many subgenera to the divisions of Bory de St. Vincent. Kant divides man into 4 varieties, white, black, copper, and olive, corresponding respectively to the Caucasian, Negro, American, and Mongolian. Hunter makes 7 varieties; Metzan 2, white and black. Luke Burke, late editor of the "London Ethnological Journal," makes 63 races of man, 28 being varieties of the intellectual and 35 of the physical races. Retzius divides all heads into short or brachycephalic, and long or dolichocephalic, each of which he again subdivides into those with straight and with prominent jaws. Prof. Zeune adopts 3 types of skull for the eastern and 3 for the western hemisphere, as follows: I. High skulls, including: 1, the Caucasian race in the old world, and 2, the Appalachian in the new. II. Broad skulls, including: 3, the Mongolian, and 4, the Carib races. III. Long skulls, including: 5, the Ethiopian, and 6, the Peruvian races. This is an exceedingly unnatural arrangement.—Dr. Prichard, in his "Researches into the Physical History of Mankind" (1826–1847), refers mankind to 7 stocks or classes of nations, the principal mark of distinction among which is the peculiar form of the skull; these are: 1, the Iranian (the Caucasian of previous writers), in the form of the skull and in their physical traits resembling Europeans, including some Asiatic and African nations; 2, the Turanian or Mongolian; 3, the American, including the Esquimaux and kindred nations; 4, the Hottentot and Bushman; 5, the Negro; 6, the Papuan or woolly-haired Polynesians; and 7, the Australian and Alfooroo nations. Taking the color of the hair as a principal character, Prichard makes 3 great varieties: 1, the melanic, with very dark or black hair; 2, the xanthous, with yellow, red, or light brown hair, blue or light eyes, and fair skin; and 3, the leucous, or albinos, with white or pale yellow hair, very soft, fair, and delicate skin, and a red hue to the choroid of the eye. According to this author, examples of these varieties are found in all the races. Martin, in his "Natural History of Man and Monkeys" (1841), divides the human race into the following 5 stocks: 1, the Japetic, including the European branch, or the Celtic, Pelasgic, Teutonic, and Slavonic nations; the Asiatic branch, or the Tartaric, Caucasic, Semitic, and Sanscritic nations; and the African branch, or the Mizraimic nations (ancient Egyptians, Ethiopians, Abyssinians, Berbers, and Guanches); 2, the Neptunian, including the Malays and Polynesians; 3, the Mongol, including also the Hyperborean; 4, the prognathous (a term adopted from Prichard), including the Negro, Hottentot, Papuan, and Alfooroo branches; 5, the occidental, including the indigenes of North and South America. Dr. Prichard, in his "Natural History of Man" (3d edition, 1848), after defining species and varieties, devotes many pages to show the influence of external conditions in modifying the races of animals and man; unable to find specific characters in the differences of color, structure of the hair, shape of the skull, or proportions of any parts of the skeleton, he points out 3 principal varieties of conformation of the head, which characterize respectively the savage or hunting, the nomadic or wandering, and the civilized races of mankind. Among African and Australian savages, the jaws are prolonged forward, constituting the prognathous form of head; among the wandering Mongolians, the skull is pyramidal, and the face broad and lozenge-shaped; and in the civilized races the skull is oval or elliptical. There are numerous nations which present forms of transition between these principal ones, according to their approach to civilization on the one hand, or their relapse toward barbarism on the other. He makes a similar division of man into 3 races according to the relations of their languages, which of all traits "seem to be the most permanently retained, and can be shown in many cases to have survived even very considerable changes in physical and moral characters." Cuvier referred the original seats of the human race to mountain chains, the Caucasian to Mt. Caucasus, the Mongolian to Mt. Altai, and the Negro to the chain of the Atlas mountains. The Hebrew Scriptures make the traditionary birthplace of mankind the banks of 4 rivers, 2 of which have been recognized as the Tigris and Euphrates, in a land rich in animal and vegetable productions. Prichard admits 3 great centres of earliest human civilization, comprising most of the tribes known to antiquity; in his own words: "In one of these, the Semitic or Syro-Arabian nations exchanged the simple habits of wandering shepherds for the splendor and luxury of Nineveh and Babylon. In a second, the Indo-European or Japetic people brought to perfection the most elaborate of human dialects, destined to become, in after times and under different modifications, the mother tongue of the nations of Europe. In a third, the land of Ham, watered by the Nile, were invented hieroglyphical literature and the arts, in which Egypt far surpassed all the rest of the world in the earlier ages of history." These 3 divisions do not correspond to the 3 indicated by the form of the skull, all of the former being more or less civilized, and having the oval or elliptical head. The Syro-Arabian or Semitic race includes the Syrians, Jews, and Arabs; Baron Larrey says that the Arabian race furnishes the most perfect type of the hu-

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man head, and believes that the cradle of the human family is to be found in Arabia; this race is intellectual, energetic, and restless. The Egyptian or Hamitic race he regards as indolent, superstitious, and stationary in its own land, which is little else than a vast sepulchre; it is entirely unlike the negro races of Africa. The Indo-European, Japetic, or Aryan race comprises the Hindoos, Persians, Afghans, Koords, Armenians, and the nations of Europe with their American colonies; he believes that the Aryan nations, on their arrival in Europe, found the country occupied by Allophylian people, who were also of eastern origin, but had migrated westward at an earlier age. The 5 great nomadic races inhabit the large central region of Asia, and belong to the Mongolian division of authors; they are characterized by pyramidal heads and broad faces. These races are: the Ugrian in the north-west, from whom the Magyars are believed to have descended, and of which the Finns, Lapps, Ostiaks of the Obi, and other Siberian tribes, are varieties; the Turkish, with their nomadic tribes, and the Ottoman branch; the Mongolian, including the Calmucks; the Tungusian, in the mountainous region between Lake Baikal and the Okhotsk sea; and the Bhotiya, inhabiting Thibet and the Himalaya chain. To the races with pyramidal skulls belong the fish-eating tribes bordering on the Arctic ocean, including the Namollos of north-eastern Asia and the Aleutian islands (akin to the Esquimaux), Koriaks, Kamtchatkans, Samoiedes, and Koorilians. To the Mongolian division belong also the Chinese, Japanese, Coreans, the Indo-Chinese beyond the Ganges, and the aborigines of India distinct from the Hindoos (the latter belonging to the Arabian stock). Among the Allophylian races before alluded to as existing in regions afterward conquered by the Syro Arabian nations, may be mentioned the Caucasians, to this day successfully resisting the Russian power, the Iberians of the Pyrénées, the Berbers of the Atlas chain, and the Guanches of the Canary islands. Among African races, the Abyssinian, a fine dark, but not negro people, is interesting as having preserved, "in the midst of Moslem and pagan nations, its peculiar literature, and its ancient Christian church," and having remains of a wide-spread Judaism, and a language approaching to the Hebrew. Of the black races of the interior of Africa the principal are the Senegambian, including the Mandingos and the Foolahs. The true negro characters are most strongly marked on that portion of the coast "which encircles the projecting region of western Africa to the inmost angle of the bight of Benin," the centre of the slave trade. The Hottentots and Bushmen of South Africa in many respects resemble the nomadic Mongolians of Asia; the warlike Caffres are said to combine the prominent forehead and nose of the European, the thick lips of the negro, and the high cheek bones of the Hottentot. (Fuller details on the kindred races have been given in the recent works by Drs. Barth and Livingstone.) The oceanic races Prichard divides into Malayo-Polynesian, Pelagian Negroes, and the Alfoorians of the New Guinea group of islands (which include the Australians). The American races are distinguished from those of the old world by their moral and social traits, and by the structure of their languages. The Mexican tribes, which, according to Prichard, arrived on the central plain of Anahuac from the north in the 7th century, found this region inhabited by the nations which have left the splendid ruins of Palenque, among whom were the Othomi, remarkable for their monosyllabic idiom; the Esquimaux and the Athabascas, with a Mongolian cast of countenance, extend across the northern portion of the continent from ocean to ocean; south of these, east of the Mississippi, were the Algonquin-Lenape and the Iroquois, with their numerous tribes, almost always at war with each other, and the Alleghanian nations toward the south; west of the Mississippi, the Sioux and the Pawnees; on the Pacific coast, the dark Californians and the tribes of the N. W. coast; in South America, the Andean nations, the Brazilio-Guarani, and the Mediterranean or central groups.—Dr. Latham, in his "Natural History of the Varieties of Man" (1850), separates the human family into 3 primary divisions, the *Mongolidæ*, *Atlantidæ*, and *Japetidæ*. The Mongolidæ inhabit Asia, Polynesia, and America; their languages are aptotic (without cases) and agglutinate, and their influence on the history of the world has been material rather than moral. He divides them into: *a*, Altaic Mongolidæ, including the Seriform (Chinese, &c.) and Turanian (Mongol) stocks, from the latter of which are descended the Magyars; *b*, Dioscurian Mongolidæ (the Caucasian races of earlier writers); *c*, oceanic Mongolidæ, including Malays, Polynesians, Papuans, and Australians; *d*, hyperborean Mongolidæ, Samoiedes and similar nations; *e*, peninsular Mongolidæ, Coreans, Japanese, and the nations of the islands and peninsulas of north-eastern Asia; *f*, American Mongolidæ, the Esquimaux and American Indians; *g*, Indian Mongolidæ, the inhabitants of Hindostan, Cashmere, Ceylon, &c. The Atlantidæ inhabit Africa; their languages are agglutinate, rarely with an amalgamate inflection, and, with the exception of the Semitic section, their influence on the world's history has been inconsiderable. He divides them into: *a*, negro Atlantidæ, occupying the central negro area of the continent; *b*, the Caffro Atlantidæ; *c*, the Hottentot Atlantidæ; *d*, the Nilotic Atlantidæ; *e*, the Amazirgh Atlantidæ, or Berbers; *f*, the Egyptian Atlantidæ; *g*, the Semitic Atlantidæ, or Copts, Abyssinians, Arabians, Syrians, Hebrews, &c. The Japetidæ inhabit Europe; their languages are rarely agglutinate and never aptotic, and their influence on the moral history of man has been greater than that of either of the others. He divides them into: *a*, occidental Japetidæ, the Celts and their branches; *b*, the

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Indo-Germanic Japetidæ, the European and Iranian Indo-Germans. In the article "Ethnology" in the "Encyclopædia Britannica," Dr. Latham gives a more recent classification, as follows: *a*, Asiatics and northern Europeans, Polynesians, and Americans, with the classes Mongolians, Iranians, Indians, Oceanians, and Americans; *b*, central and southern Europeans; *c*, Africans and south-western Asiatics, with the classes Semitic, Nilotic, Caffre, Negro, and Hottentot. In both these classifications the divisions are made on philological grounds; he seems satisfied with the doctrine: "1, that as a matter of fact, the languages of the earth's surface are referable to one common origin; 2, that as a matter of logic, this common origin of language is *prima facie* evidence of a common origin for those who speak it."—Dr. Pickering, in the "Races of Man, and their Geographical Distribution" (1848), enumerates 11 races, divided into 4 groups, according to complexion, as follows: *a*. White, including: 1, Arabian, with nose prominent, lips thin, beard abundant, and hair straight and flowing; 2, Abyssinian, with complexion hardly becoming florid, nose prominent, and hair crisped. *b*. Brown, including: 3, Mongolian, beardless, with perfectly straight and very long hair; 4, Hottentot, with negro features, close woolly hair, and diminutive stature; 5, Malay, with features not prominent in profile, darker complexion, and straight and flowing hair. *c*. Blackish brown, including: 6, Papuan, with features as in 5, abundant beard, harsh skin, and crisped or frizzled hair; 7, Negrillo, apparently beardless, with diminutive stature, negro features, and woolly hair; 8, Indian or Telingan, with Arabian features, and straight and flowing hair; 9, Ethiopian, with features intermediate between the last and the negro, and crisped hair. *d*. Black, including: 10, Australian, with negro features, but straight or flowing hair; and 11, Negro, with close woolly hair, flattened nose, and very thick lips. Six of the races are Asiatic, and 4 African, while the white race is common to both hemispheres; the Malay, Negrillo, and Papuan are island races, the other 8 are continental; the Malay is a truly maritime race, and the most widely scattered of all. Assuming the population of the globe to be 900,000,000, he gives to the races the following numbers according to the above figures: 1 has 350,000,000; 3, 300,000,000; 5, 120,000,000; 8, 60,000,000; 11, 55,000,000; 9, 5,000,000; 2, 6, and 7, each 3,000,000; and 4 and 10, each 500,000. He considers table-lands as the natural birthplaces of civilization, and finds 4 such, in Mexico, Peru, Thibet, and Abyssinia; he regards man as "essentially a production of the tropics, since he is born without natural clothing;" he thinks there is no middle ground between the admission of 11 distinct species in the human family and the reduction to one, and that, if the latter opinion be adopted, it implies a central origin, and that origin probably the African continent. Prof. Dieterici, an eminent Prussian statistician, gives the following estimate of the population of the earth in "Petermann's Journal" for Jan. 1859. According to him, the total population of the globe is about 1,300,000,000, divided as follows: in Europe, 272,000,000; in Asia, 755,000,000; in Africa, 200,000,000; in America, 59,000,000; in Australia, 2,000,000. Divided by races, there are 375,000,000 Caucasians (the greater part in Europe), 528,000,000 Mongolians, 200,000,000 Malays, 196,000,000 Africans, and 1,000,000 Americans. In this estimate, the Africans, Malays, and Mongolians are probably overrated, and the Americans certainly greatly underrated. Divided by religions, about 25 per cent. are Christians, $\frac{1}{16}$ per cent. Jews, 46 per cent. Asiatic religions, 12½ per cent. Mohammedans, and 15½ per cent. heathens; the Christians include about ⅓ Roman Catholics, a little more than ⅓ Protestants, and a little less than ⅓ Greeks.—Dr. S. G. Morton, whose principal works are the *Crania Americana* (1839), and the *Crania Ægyptiaca* (1844), divides man into the following groups in his catalogue of skulls, more for convenience of study and examination than as an attempt at scientific classification: I. Caucasian group, with the Scandinavian, Finnish or Tchudic, Suevic, Anglo-Saxon, Anglo-American, Celtic, Slavonic, Pelasgic, Semitic, Berber, Nilotic, Indostanic, and Indo-Chinese races; II. Mongolian group, with the Chinese and Hyperborean races; III. Malay group, with the Malayan and Polynesian races; IV. American group, with the barbarous and Toltecan races; V. Negro group, with the native Africans, Hovas, and Alfoorian races; VI. the mixed races, Copts, Nubians, &c.—Van Amringe ("Outline of a new Natural History of Man," 1848) believes that there are 5 species of mankind: 1, the Semitic, including the Caucasian nations generally, of strenuous temperament; 2, the Japetic, including the Mongolian races, Esquimaux, Aztecs, and Peruvians, of passive temperament; 3, the Ishmaelitic, including most of the Tartar and Arabian tribes and the American nations, of callous temperament; 4, the Canaanitic, including Negroes and Australians, of sluggish temperament; 5, the Esauitic, including Malays and long-haired Negroes; this last he regards as doubtful.—Weber reduces the forms of the human pelvis to 4, which correspond to the forms of skull characteristic of the several races; these are the oval, most frequent in Europeans; the round, most frequent in the American nations; the square, most common in people resembling Mongolians; and the oblong or wedge-shaped, most common in the nations of Africa.—Hamilton Smith, in his "Natural History of the Human Species" (Boston ed. 1851), regards Thibet, the Gobi desert, and the surrounding mountain chains, either as the primitive cradle of man, or as the locality where a portion of human beings found safety after some great convulsion or change of the earth's surface; he illustrates his views by a diagram in which the apex of an equilateral triangle

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points to the north, the southern line representing the Himalaya chain with its streams ending at the Indian ocean, the eastern similarly leading to the Pacific, and the western to a sea gradually contracted into the Caspian. On the south of this triangle he places the woolly-haired or tropical type, on the west the bearded or Caucasian type, and on the east the beardless or Mongolic type.—Prof. Agassiz, in the "Types of Mankind," by Messrs. Nott and Gliddon (1854), gives a sketch of the natural provinces of the animal world (see FAUNA), and their relation to the different types of man, in which he concludes "that what are called human races, down to their specialization as nations, are distinct primordial forms of the type of man." He makes the following realms: I. Arctic, inhabited by Hyperboreans; II. Asiatic, by Mongols; III. European, by white men; IV. American, by American Indians; V. African, by Nubians, Abyssinians, Foolahs, Negroes, Hottentots, and Bosjesmans; VI. East Indian or Malayan, by Telingans, Malays, and Negrillos; VII. Australian, by Papuans and Australians; and VIII. Polynesian, by South sea islanders. Dr. Nott, in the same work, after stating that in the present state of our knowledge all classifications must necessarily be arbitrary, says that the 5 usually admitted great divisions of man comprehend many original subdivisions; the nearest approach to a scientific classification he considers that of Agassiz, founded on the relation of man to zoological provinces. In a subsequent work ("Indigenous Races of the Earth," 1857) Messrs. Nott and Gliddon give an ethnographic tableau in which the races are divided zoologically according to the 8 realms of Prof. Agassiz; they are also grouped physiologically (after Desmoulins, Achille Comte, and O. D'Halloy) into 65 families, 7 belonging to realm 1 of Agassiz, 12 to realm 2, 16 to realm 3, 14 to realm 4, 8 to realm 5, 3 to realm 6, 2 to realm 7, and 3 to realm 8—taking the numbers as given above, which are somewhat changed in the last work. The same realms have also their corresponding classes arranged linguistically, after Maury, Crawfurd, Logan, &c., as follows: realm 1, with the Finno-Ougrian, containing 6 groups; realm 2, with the Tartarian, Sinic, North and South Dravidian, containing 5, 6, 4, and 6 groups respectively; realm 3, with the Ougrian, Iberian, Indo-Germanic or Japetic, Semitic, and Hamitic, containing respectively 3, 1, 6, 9, and 4 groups; realm 4, with the northern, central, and southern, containing 6, 4, and 4 groups; realm 5, with the Atlantic, Mandingo, upper Guinean, upper Soodanian, delta of the Niger, basin of the Tchad, central Africa, Senegambian, Guinean, Congo, Madagascar, and Hottentot, containing 4, 9, 3, 4, 3, 1, 2, 4, 3, 8, 1, and 3 groups; realm 6, with the polyglot class, containing 13 groups; realm 7, with the polyglot class, containing 2 groups; and realm 8, with the monoglot and polyglot classes, containing 4 and a single group.—The above classifications, the most important and generally accepted in variously modified forms, though none of them natural or satisfactory, will suffice to show the imperfection of the science of ethnology. The limits of this article will permit only an allusion to the great questions which are intimately connected with this subject, such as the theories of unity or diversity of origin of the races; the effects of physical agents in producing varieties in animals and man; the phenomena of hybridity; the geographical distribution, migrations, and affiliations of the species; disputed points in archæology, philology, chronology, and physical geography; and the bearings of these various researches upon the theological opinions of the day. If ethnology is to advance beyond the above given views of Prichard, it is probably by the study of philology, zoology, and archæology, as initiated by Bunsen, Lepsius, Morton, Agassiz, Nott, and Gliddon, that further light and progress will be obtained. Those who wish to pursue this interesting and difficult subject are referred to the various authors mentioned in this article, and especially to the copious references of the works of Nott and Gliddon, and to the Boston edition of Hamilton Smith. A detailed account of the different Asiatic, European, and African races is given by Dr. Latham in his last work, "Descriptive Ethnology" (2 vols. 8vo., London, 1859).—As to the time that man has existed on the earth, there is great difference of opinion from the limited Hebrew chronology of about 6,000 years to the nearly 22,000 years adopted by Bunsen; according to the latter, the flood took place in northern Asia between 10,000 and 11,000 years B. C., at which time the Aryans emigrated from the valley of the Oxus and Jaxartes, and the Shemites from the valley of the Tigris and Euphrates. In his address before the British association at Leeds, in Sept. 1858, Prof. Owen alludes to Mr. Horner's examination of the rate of increase of the sediments of the Nile in Egypt as a test of the lapse of time, from which the existence of man 13,375 years ago is inferred; of man, moreover, in a state of comparative civilization. Prof. Max Müller has also attempted to extend the history of the human race by the perception and application of analogies in the formation of modern and ancient languages. The majority of naturalists will perhaps agree with Prof. Owen when he says: "I may advert to the uniform testimony of different witnesses—to the concurrence of distinct species of evidence—as to the much higher antiquity of the human race than has been assigned it in historical and genealogical records."

ETHYLE (Gr. *αἰθηρ*, upper air, and *ὕλη*, material), the name given by Berzelius to what was then a hypothetical substance, which he regarded as the base of ether, and of which ether is the oxide. It was not isolated during his life; but in 1849 Dr. Frankland obtained it by the action of zinc upon its iodide at a very high temperature. It is a colorless inflammable gas, without odor, of specific gravity 2.00394. Under pressure of 2½ atmospheres, it becomes a color-

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less transparent fluid. Composed of C_4H_8, it is represented by the symbol E.

ETNA (Lat. *Ætna*, probably from Gr. *αἴθω*, to burn), a volcano of Sicily, called by the inhabitants of the island Mongibello, from the Saracen *Gibbel Uttamat*, or mountain of fire. It rises from the E. coast of the island, midway between its N. and S. extremities. The port of Catania is on the prolongation of its S. foot, and, as the history of this once wealthy and highly populous town shows, is by no means beyond the reach of its devastating lava currents. North of the mountain is the Val di Demone, watered by the river Alcantara, and 30 miles S. of it is the N. margin of the Val di Noto, in which the waters of the Giaretta find their way toward the coast amid the ancient scoriæ of the great volcano. The country between these rivers is occupied by the mountain with its various ridges, volcanic cones, and deep depressions, which cover altogether an area of about 87 miles in circumference; yet the lava has spread far beyond these limits. In the midst is the apex of the great conical mass, the highest summit, as ascertained trigonometrically by Capt. Smyth in 1815, being 10,874 feet above the sea. Sir J. Herschel in 1824, ignorant of this measurement, determined the height by careful barometrical measurement to be 10,872½ feet. The latitude of the point is 37° 43′ 31″ N., and the longitude is 15° E. The cone, at the summit of which is the great crater, is in the midst of a comparatively plane region, 9 miles in circumference, the highest point being 1,100 feet below the principal apex. Around the mountain, at its base, is a fertile and delightful region known as the *regione culta*. Near Catania this is 11 miles broad, till one reaches in ascending the *regione silvosa*, or woody district; but on the N. side the wood skirts the mountain to within half a mile of its foot. This lowest belt is the region of cultivation; towns and villages are clustered upon it; and in the rich soil of the decomposed lava and tufa are flourishing plantations of olives, vines, corn, fruits, and aromatic herbs. Though, in the frequently recurring eruptions of the volcano, some of these are often swept off, or buried beneath the flow of lava, the attractions of the delicious climate, and of a soil so readily producing the necessary sustenance of life, overcome the fears of a people familiar with the dangers, and render them comparatively indifferent to the annoyances of the sharp volcanic dust that, according to Capt. Smyth, injures and disfigures their eyes, their persons, furniture, and houses. The woody region encircles the mountain in a belt 6 or 7 miles in width; but the extensive forests are much broken in upon by the ravages of the lava. Here one passes through fine groves of chestnut and cork trees, and in the higher portions pines of great magnitude abound, together with oak, beech, and poplar, and hawthorn of immense size. A cluster of what appeared to be 7 chestnut trees growing together is described by Capt. Smyth, the largest of which measured 38 feet in circumference, and the whole 163 feet. The inner portion is much decayed, and a public road passes through the clump of trees. This region affords pasturage for many herds and flocks. Its elevation gives it a cooler and more agreeable temperature than that of the lowest belt. At the height of 5,362 feet is the Goat's cavern or grotto, frequented by these animals in bad weather, and formerly a resting place for travellers, until the shelter known as the English house was built immediately under the cone, at the height of 9,592 feet, at the expense of some British officers who were stationed in Sicily. The upper edge of the woody region is estimated at 6,279 feet above the sea. Beyond it is the cold and desolate zone of the mountain called the *regione deserta*. Its surface spreads out in broad tracts, compared to plains, which are rough and black with the naked lava and scoriæ, or white with drifts of snow, which perpetually cover the highest summits. These also collect in the crevices and grottos of this portion of the mountain, and becoming solidified into ice, they furnish most grateful supplies of this material to the inhabitants of the island, and of Malta and the neighboring region of Italy. In 1828, when the whole country was parched with the excessive heat, a quarry of perennial ice was opened under a stratum of lava, so situated that this must have flowed in a melted state at some distant period over the snow, which, as suggested by Sir Charles Lyell, was no doubt protected from the action of the heat by a previous covering of fine dust and scoriæ. The bishop of the diocese derives a revenue from the sale of this ice, and what is obtained from a small portion on the N. side of the mountain is said to amount to £1,000 per annum. The great crater is upon a mountain of stones and ashes, which rises about 1,100 feet above its base in this snowy tract. The diameter of its mouth is estimated by different travellers at from 2½ to 4 miles, and the depth from 600 to 800 feet. Sulphurous smoke continuously ascends from it, and rumbling noises are at all times heard. The view from this summit at sunrise is magnificent. The mountain itself, lying directly beneath the eye of the observer, which can penetrate even into the inferior cones that are distributed upon its flanks, presents the most original feature of the landscape. These cones, however, are best seen from the lower borders of the desert region, where, as stated by Sir Charles Lyell, they afford "one of the most delightful and characteristic scenes in Europe. They are seen of every variety of height and size, and are arranged in beautiful and picturesque groups. However uniform they may appear when seen from the sea, or the plains below, nothing can be more diversified than their shape when we look from above into their craters, one side of which is generally broken down." Of these secondary volcanoes Lyell enumerates no less than 80 which are of considerable dimensions, and one of these, called Monte Minardo, near Bronte, is 700 feet high; and the double hill Monti Rossi, near Nicolosi, formed in 1669, is 450 feet high, with a

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base 2 miles in circumference. They are produced by lateral eruptions in the desert region or in the wooded belt below. In the latter their height is subsequently reduced by the flow of lava from higher sources, which gathers around, and in some instances buries them and even pours into their craters.—The earliest recorded eruption of Etna is one mentioned by Diodorus Siculus, which caused the Sicani, who then lived near the mountain, to desert its vicinity and move further to the south. No date is given to this event, but it appears to have happened before the Trojan war. The next are 3 eruptions referred to by Thucydides, of which one was in 475 B. C., one in 425, and one supposed to have been in 565. These, added to the later recorded eruptions to the present time, make nearly 60 in all. The most important are those of 1669, 1755, 1787, 1792, and 1852. An earthquake in March, 1669, destroyed all the houses in the village of Nicolosi, situated 10 miles from Catania, near the lower margin of the wooded district. Streams of lava not many days afterward broke forth from chasms which opened in different parts of the mountain. These destroyed as many as 14 villages. From a gulf that formed near Nicolosi, the sand and scoriæ were projected that produced in the course of 3 or 4 months the double cone Monti Rossi. A fissure 12 miles long was formed, which emitted a most vivid light, and extended to within a mile of the summit of Etna. Afterward 5 other parallel fissures opened, which gave forth smoke and loud bellowing noises. These fissures, which were without doubt partially filled with lava, afford an illustration of the manner in which the porphyritic dikes are formed, which are seen cutting the lavas, and projecting in the form of walls from the precipitous sides of the deep valleys of the mountain; and also of the origin of the trap dikes of older formations. By the flow of the lava among the deep caverns within the mountain, its vaulted foundations were melted away, and the crest, rent with numerous fissures, settled down into the vacant spaces. To protect the city of Catania, its walls next the mountain had been raised to the height of 60 feet; but the lava, irresistible as the swelling tide, and as slow in its motion, rose steadily till it overtopped the rampart, and poured a cascade of liquid fire into the midst of the houses. Long afterward, when excavated by the prince of Biscari, the solid lava was brought to view, its layers curling over the wall, as if just petrified in their flow. Its rate of progress varied greatly with the consistency of the melted matter and the slope of the surface. The greater part of the 15 miles of its flow to the sea was accomplished in 20 days, but the last 2 miles were only at the rate of 22 feet per hour. Its surface exposed to the air was a crust of solid rock; through the side walls streams of the fluid lava often burst out, and by excavating into the great current at suitable places the flow might be diverted in new directions. Attempts that were made to do this by some of the inhabitants of Catania, in order to protect their town, were opposed with arms by the people of Paterno, as the new current threatened to bring destruction upon their habitations. In some places hills of older lava were melted into the flowing stream, and thus swept away. In others the cooling matter taking an arched form protected the objects upon the surface by enclosing them in grottos of lava. Thus were preserved, and afterward obtained by excavating into the solid lava to the depth of 35 feet, many valued articles from one of the churches of Mompiliere, one of the towns overflowed by this eruption. As Lyell observes, it seems very extraordinary that any works of art, not encased with tufa, like those in Herculaneum, should have escaped fusion in hollow spaces left open in this lava current, which was so hot at Catania, 8 years after it entered the town, that it was impossible to hold the hand in some of the crevices. The great lava current as it flowed into the sea had spread over a width of 600 yards, and its depth was estimated at 40 feet. The water was thrown into violent commotion by this intrusion of heated matter. Sounds louder and more terrific than peals of thunder were constantly sent forth, and the light of the sun was darkened by the clouds of vapor that arose. The fish were destroyed along the coast, and many months passed before the water became again clear and transparent.—The eruption of 1755 is remarkable for a great inundation caused by the flow of two streams of lava upon a vast collection of snow. For 8 miles down the flanks of the mountain the torrent poured, sweeping on the loose scoriæ and blocks of lava, which were deposited in the plains below. The inhabitants believed that the water was discharged from the crater itself, and the stories of its saltness and of the marine shells contained in it are still found in the popular accounts of this eruption.—The successive piles of lava which compose the great mass of Etna, and the fossiliferous strata which crop out on the more exposed eastern side of the mountain, afford some interesting data bearing upon the time that has elapsed during the accumulation of these materials. For, as observed by Ovid in presenting the views of Pythagoras, there was a time when Etna was not a burning mountain, and a time will arrive when it will cease to be such. This subject has been admirably treated by Sir Charles Lyell in his "Principles of Geology," and illustrated from the drawings he prepared in his examinations of the localities. The lavas, as seen on the southern and eastern sides of the mountain, rest upon stratified clay sands and volcanic tufa, which contain marine fossil shells, all or nearly all of which are identical with species now inhabiting the Mediterranean. These strata form a series of hills 600 to 800 feet in height, which extend along the southern margin of the mountain. They indicate that the bed of the sea has during the existence of the present testacea been raised several hundred feet above its ancient level. The sedimentary

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strata, and the limestone of the newer pliocene period upon which they rest, define the origin of the flows of lava to be within this very recent period in the history of the formations which compose the crust of the earth. Were there data furnished by long kept records, by which the average rate of increase of volcanoes could be determined, the application of these to the case of Etna might furnish some approximation toward the time that has passed while its 10,000 feet or more of layers of lava have been accumulating. But the recorded observations of the action of volcanoes are too incomplete, and this action is too variable in its nature, for any data we possess to shed light upon this question. A single volcano, as that of Jorullo in Mexico, with thousands of little cones about it, is known to have risen at once to the height of more than 500 feet; while another, as that of Ischia, is known to have lain dormant with no increase of its dimensions for 17 centuries. The only data, therefore, upon which any calculation of this sort can be based, must be furnished by what we know of the structure and history of the volcano itself. Upon the eastern side of the mountain is a remarkable valley 4 or 5 miles wide, called Val del Bove, which extends far in toward the centre, and presents on each side precipitous walls, that attain at the upper extremity a height exceeding 3,000 feet. A section furnished by these walls, and the naked conical peak 1,000 feet high, expose the structure of nearly half the height of the mountain. All this consists of alternating beds of lava and of breccia, or broken fragments of lava, which appear each to have been produced by a flow of the liquid material deposited upon the older layer beneath it. All these layers incline toward the sea, as if the currents had uniformly flowed in that direction. Through these piles of stratified lava many of the secondary cones are seen projecting, and in such relation to the layers that it is apparent they were thrust up subsequently to the consolidation of these. Turning now to the historical records, there is nothing found in them which would lead to the opinion that the altitude of the mountain has materially varied within the last 2,000 years. Of the 80 cones previously referred to as seen upon its flanks, only one, Monti Rossi, has been produced within this time. It is hence reasonable to suppose that a great many centuries elapsed while these cones were produced. If we go back to the period of the origin of the oldest among them, the long series of the stratified lava beds of the Val del Bove lie beneath these, and other series of more ancient cones still are found buried under these strata which flowed around and concealed them from view. "In the deep sections of the Val del Bove nothing seems to indicate that the ancient lava currents exceeded in dimensions those of modern times; and there are abundant proofs that the countless beds of solid rock and scoriæ were accumulated, as now, in succession. On the grounds therefore already explained, we must infer that a mass so many thousand feet in thickness must have required an immense series of ages anterior to our historical periods for its growth; yet the whole must be regarded as the product of a modern portion of the tertiary epoch." (Lyell's "Principles," ch. xxv.)

ETON, a town of Buckinghamshire, England, on the left bank of the Thames, opposite Windsor, 22 m. W. from London by road; pop. in 1851, 3,666. Its college, the most celebrated of English public schools, was founded by King Henry VI. in 1440, and endowed by a gift from his own demesne lands and those belonging to some priories whose revenues had been appropriated to religious houses abroad. The original foundation consisted of one provost, 10 priests or fellows, 4 clerks, 6 choristers, one master, 25 poor scholars, and as many poor men, or beadsmen. Henry VI. intended it as a seminary for a college in one of the universities, and therefore founded, contemporaneously with Eton, King's college, Cambridge, to which Eton was to be preparatory. The first stone of the building was laid July 3, 1441. In 1443 Henry VI. increased the number of scholars to 70 and reduced the beadsmen to 13. At present the foundation consists of a provost appointed by the crown, a vice-provost, 6 fellows, 2 chaplains called conducts, 10 lay clerks, 10 choristers, beside inferior officers and servants, and 70 scholars, who since the reign of George III. have been called "king's scholars." As Eton was a Lancastrian foundation, it suffered under the rule of the house of York, and was curtailed by Edward IV. of many of its possessions. More fortunate under the Tudors, Eton was specially excepted from the act of parliament passed in the time of Henry VIII. for the dissolution of colleges and chantries. At this period its revenues were estimated at £1,100. In 1506, the total income was £652. Its present income is about £7,000. The college buildings consist of 2 quadrangles, built partly of freestone, but chiefly of brick. The scholars on the foundation are lodged and boarded in the college, and by way of distinction are called collegers. They are admissible from the age of 8 to 16, and unless put on the roll for admission to King's college at 17, are superannuated and obliged to leave at 18. If put on the roll, they may continue till 19. The foundation scholars must be born in England and of parents lawfully married. By the statutes they should be instructed gratis and clothed in some coarse uniform, but in neither of these points are the statutes adhered to. A small sum of £6 or £7 per annum is charged to the parents of every foundation scholar who are able to pay it. Every year the 12 head boys are put on the roll of King's college, but continue at Eton until there is a vacancy or until superannuated. At King's college the Etonians are maintained free of expense, and after 3 years they succeed to fellowships. On an average 4 scholars go to King's college yearly. There are also 2 scholarships at Merton college, Oxford, for foundation scholars who are not elected for

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King's college. These latter are called *portionistæ*, or by corruption, postmasters. In 1842 Prince Albert instituted an annual prize of £50 for proficiency in the modern languages. The larger number of Etonians are not on the foundation, and are called oppidans. They do not board in the college. The annual expenses of an oppidan amount to about £150 or £200. The 6th form is the highest in the school, and is limited in number to 22. Of these the 10 highest are styled monitors. The head boy is called "the captain." The classes are divided between the lower and upper school. There are a head master and a lower master, 12 assistant masters in the upper school and 4 in the lower school, beside a mathematical master. There are also masters of the French, German, and Italian languages. The course of instruction is almost wholly classical; mathematics and the modern languages are only studied in extra hours. The annual elections take place in the last days of July every year. At the elections of 1858, the total number of collegers and oppidans was 757, being an increase of 26 over the year previous. In 1764, at which period the school was very prosperous, the number of boys amounted to 516. The black hat and the white neckerchief are distinguishing marks of an Eton boy's costume. The system of fagging, by which the boys in the lower school are subject to the orders of the members of the 6th form, is in full vigor at Eton. The Eton montem was a peculiar ceremony, formerly biennial, but after 1759 held triennially on Whit-Tuesday, and discontinued since 1844. On this occasion the boys marched in procession about 1½ m. to an elevation on the Bath road called Salt hill, under the lead of the head boy of the foundation scholars as captain. Here they spent the day, partook of a bountiful breakfast and dinner, with music and various ceremonies, and collected toll from all spectators and passers-by. The scene was visited by great numbers of people, and even sometimes by the royal family, and the contributions, called salt, have been known to exceed £1,000. After deducting expenses, the remainder was paid over to the captain, who in 1847 was indemnified by the queen for his loss by the omission of the ceremony. Among the celebrated men educated here may be mentioned John Hales, the poet Waller, Sir Robert Walpole, Harley, earl of Oxford, Lord Bolingbroke, Earl Camden, the earl of Chatham, the Hon. Robert Boyle, Lord Lyttleton, the poet Gray, Horace Walpole, Steevens the editor of Shakespeare, Fox, Canning, the marquis of Wellesley, the duke of Wellington, Henry Hallam, and Lord Derby.

ETRURIA, or TUSCIA (called by the Greeks *Tyrrhenia*), a division of ancient Italy, bounded W. by the Tyrrhenian sea, and separated on the N. W. from Liguria by the river Macra, N. E. by the Apennines from Cispadine Gaul, E. and S. by the Tiber from Umbria and Latium. It was a fertile and well cultivated country. Its chief rivers were the Tiber and the Arnus (now Arno); its chief lakes the Thrasymenus (now lake of Perugia), renowned for one of the great victories of Hannibal, the Vadimonis (Bassano), the Volsiniensis (Bolsena), and the Sabatinus (Brocciano.) Of its mountains, the Ciminius (Monte di Viterbo) and Soracte (Monte di San Oreste) are often mentioned. The testimony of ancient writers, and late discoveries of antique monuments, comprising walls, *cloacæ*, tombs adorned with sculptures, vases, coins, &c., prove that Etruria was inhabited by a civilized and cultivated people long before the foundation of Rome. They were called Etrusci or Tusci by the Romans, Tyrrheni or Tyrseni by the Greeks. Their national name was Rasena. They were regarded as autochthones by some of the ancient historians, and by Herodotus as descendants of a colony from Lydia, led there by Tyrsenus, son of Atys, an ancient king of that country. The authenticity of this story, however, though corroborated by Dionysius, is rendered doubtful by the circumstance that Xanthus, the national historian of Lydia, ignores both the expedition and the name of the prince its leader. The relation of Herodotus is now generally believed to have been one of those mythical legends in which the earliest history of the ancient nations is wrapped, and to have represented the common Pelasgian origin of the primitive inhabitants of Lydia and Etruria. But there is sufficient ground to believe that these Pelasgian Etruscans, the relatives of the Umbrians, Osci, Siculi, and other ancient Italian tribes, received a part of their culture, which became the source of that of the Romans, by subsequent importations from the countries of the East, from Egypt, Phœnicia, or Asia Minor. According to Mr. Layard, several representations on the Etruscan monuments bear no little resemblance to the lately discovered works of the Assyrians. The influence of Grecian art and civilization upon the Etruscans is evident, and it can easily be proved that it continued to be exercised even at the period which followed the foundation of Rome. It is now generally supposed that the Rasena immigrated from the north, probably from Rhætia, now the Tyrol, and subdued the more ancient Pelasgians, Etruscans, Tuscans, or Tyrrhenians, with whom they were finally blended into one powerful and flourishing nation. In Etruria they formed a confederacy of 12 cities with adjacent districts, which are supposed to have been the following: Cære (now Cerveteri, Old Cære), Tarquinii, in Roman history the suburb of the Tarquins, Rusellæ (Roselle, remarkable for its monuments), Vetulonia (Torre Vecchia), Volaterræ (Volaterra), known as a watering place, Arretium (Arezzo), Cortona (Cotrone), Perusia (Perugia), Volsinii (Bolsena), Faleriі (Falari), known by the siege of Camillus, Veii (Isola Farnese), the neighbor and long rival of Rome, taken by Camillus after a siege of 10 years at the beginning of the 4th century B. C., and Clusium (Chiusi), the seat of King Porsena. Other important places of Etruria were: Pisæ (Pisa), founded according to a legend by wandering companions of

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Nestor from Pisa in Elis; Fæsulæ (Fiesole), near which Catiline was defeated, 62 B. C.; Populonia, known for its coins; Luna, Volci, &c. Beyond the limits of their country they possessed the land on both sides of the Po, from the Ticino to Bologna, called by them Felsina. This country, which they conquered at the time of their immigration into Italy, or shortly after, and which was divided into 12 equal districts, was afterward taken from them by the Gauls. They had flourishing colonies in Corsica, Ilva (Elba), and in Campania, where they are supposed to have founded (about 800 B. C.) a confederacy similar to that of Etruria. Their navy was powerful on the Mediterranean at a very early period; a legend mentions an attack upon the Argo, the ship of the Argonauts, by Tyrrhenian mariners. Their commercial vessels visited the eastern shores of the Mediterranean. The inhabitants of Cære were dreaded as pirates. The growth of their commerce, as well as of their power on land and sea, was followed by a rapid development of industry and art, refinement and luxury, in their cities. Their coins in bronze, their urns and sculptures, are proofs of their great proficiency in the arts; the frequently occurring representations of festive entertainments, games, races, and dances, accompanied by music, prove their love of recreation, no doubt fostered by the mildness of their beautiful climate. They also had national assemblies for religious and political purposes, celebrated at the temple of Voltumna in Volsinii. Their religion resembled in most of its conceptions the polytheism of the Greeks and Romans; it appears, however, to have been deeper, gloomier, and less fanciful than that of the former. The names of many of their deities, who were divided into higher or hidden and other gods, and were believed to reside in the remotest north—a notion current among the Assyrians and other Asiatic nations (Isaiah xiv. 13)—seem to mark the transition from the Grecian to the Roman forms. Tina (Jupiter), by some critics compared with *Ζην*, the root of *Ζευς*, *Ζηνος*, presides over the council of 12 *consentes* or *complices*, probably personifications of the 12 constellations of the zodiac. They had lunar and solar divisions of time, and cycles of more than a century. Of their numerous sacred books, the principal of which were believed to contain the revelations of the demon Tages, the so called Acherontic taught how to propitiate the gods, to delay fate, and to deify the soul. Many of their religious rites, those of augury for instance, were adopted by the Romans, who also imitated their games, insignia, and triumphal distinctions. Their priests, called *lucumos*, appear at the same time as heads of noble families, and as kings or rulers of cities. They formed the senate of the confederacy, which seems to have consisted of loosely connected independent and sovereign members, at a later period ruled by magistrates chosen annually. The common people were dependent upon the priestly aristocratic families in a kind of feudal clientship, whose forms appear more servile than in the similar Roman institution. Freemen also occur in the history of some of the confederate cities, but as a politically unimportant class.—The most flourishing period of the history of Etruria comprises about 3 centuries before and as many after the foundation of Rome. Through the Tarquins, who were Etruscans, they may have even exercised a kind of dominion over their younger neighbor, as some modern critics suppose. Porsena, king of Clusium, who made war on Rome for the restoration of Tarquin the Proud, compelled the Romans to a humiliating treaty. But scarcely had Rome gained peace from him when it commenced war with another Etruscan enemy, Veii (485 B. C.). This war, often interrupted by truces, lasted for 90 years, and ended with the fall of the Etruscan state, owing probably to the distraction of the confederacy during the same period by frequent, successful, and devastating incursions of the Syracusans, by attacks of the Samnites upon its Campanian dependencies, and by the threatening advance of its northern neighbors, the Gauls. After the invasion of the latter under Brennus, the Ciminian forest was for some time the boundary between Etruria and the land of the Romans. This was however soon passed by the conquerors of Veii and Falerii, and the two battles fought near the Vadimonian lake, by Quintus Fabius (310) and Publius Cornelius Dolabella (283), finally broke the power of Etruria. The social relation to Rome, into which it entered in 280 B. C., was changed after the social war, in reward for its fidelity, into Roman citizenship. Soon afterward Etruria suffered greatly from the revenge taken by Sylla on the partisans of Marius in its cities. Whole districts were given as confiscated estates to the veterans of the dictator, who afterward became the accomplices of Catiline (63–62). Octavianus, too, had his military colonies in Etruria. The history of modern Etruria, a kingdom created by Napoleon in 1801, and given to Louis, crown prince of Parma, ruled after his death by his widow Maria Luisa of Spain as regent, and in 1807 annexed to France as a province, belongs to that of Tuscany (a name derived from the Roman Tuscia). Among the numerous writers who have treated of the antiquities of Etruria, the most instructive are Lanzi, Inghirami, Niebuhr, Ottfried Müller, Hey, Wachsmuth, Hormayr, Steub, Dorow, Micali, Abeken, Secki, Lepsius, Gerhardt, Bunsen, and Witte.

ETRUSCAN LANGUAGE, the language of the ancient Etrurians. Dionysius of Halicarnassus and Bochart regard the Etruscan as an aboriginal language; Fréret makes it Celtic, Ciampi and J. Kollar Slavonic, Micali Albanese; L. Lanzi derives it from the Greek and Latin, and holds that the Umbric, Volscic, Oscic, and Samnitic are dialects of it; O. Müller thinks it akin to the Greek; others derive it from Rhætia; and finally, Lami, Pfitzmaier, and others, suppose it to be Semitic, a hypo-

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thesis which in 1858 J. G. Stickel demonstrated to be the truth. Its alphabet consists of 21 letters, almost coincident in form with the ancient Greek letters, written from right to left, but corresponding in value to those of the Hebrew, though not used as numeral signs. The element *d* and the Hebrew *samech* are wanting; *g* and the Hebrew *teade* seldom occur; but the *u*, taken from the Greek Y, exists, though wanting in the Hebrew. The Semitic aspirates and gutturals are much softened, and consonants melt into their kindred vowels, the latter being mostly written instead of being indicated by their diacritic points. Guttural sounds are not, however, altogether abolished. *T* takes the place of *d*, and cognate letters are freely interchanged. We subjoin some examples of Greek and Latin words in their Etruscan forms: *Tarchna*, *Meurva*, *Menles*, *Pultuke*, *Elshsentre*, *Utuze*, *Itus*, *Hatri*, &c., for Tarquinius, Minerva, Menelaus, Polydeukes, Alexandros, Odysseus, Idus, Adria, &c. The orthography is more fixed than that of the other ancient Italian languages. Pliny says that the Etruscan writing was prior to the building of Rome, but its origin is not yet ascertained. L. Bourget discovered 16 epigraphic letters, and determined the value of several of them; Lanzi found 3 more, and Montani one. There are few words which are analogous to the Greek or Latin, the terminal *s* being dropped, and *e* being the most frequent ending; thus, *Pele*, *Tute*, are Etruscan for Peleus, Tydeos. The language is poor in particles and simple in construction. There are few words which cannot be reduced to Hebrew, Chaldaic, or Arabic originals. But few of the numeral words and figures are yet known, viz.: 5 (*hems*), written with the inverted sign of 50 (*hemsin*), which is the initial of this word, somewhat modified to form a Latin V; 10 (*tesen*, from a Sanscrit root), written with the sign of *t*, a cross, whence the Latin X (unless this be two Vs combined); 100 (*t'at*, Slavic *sad*), written with the sign of *t* final; and 1,000 (*akep*), written with the sign of *b*. The following are specimens of proper nouns: *Turuns* (rock, castle, town), whence Greek Τυρρηνοι; *Atri* (hedged in, court, wall, confluent), whence Adria, *atrium*, and most likely *Etr-uzq* (wall-strong, fort-builder); *Mantuha* (wet place), whence Mantua, one of the 12 cities of Cispadane Etruria, which was the last to fall into the power of the Celts; *Agylla* (roundness), later *Cære* (*gere*, city); *Tarchna* (roadstead, or way for ships). The termination *al*, taken for a patronymic sign, signifies "risen, rising;" it is found in many proper nouns, such as Ceicnal, Cfelnal (*Cilniæ gentis*, to which Mæcenas belonged, a Mæcnatial on his mother's side), Leicnal, Larthal, &c.; *sa* final is supposed to denote the name of a married woman by modifying that of the husband (like the German *inn* and the Slavic *a*), as *Lecne-sa*, the wife of Licinius. Among Etruscan words and phrases are *itus* (*itis*, day), whence *idus*, day of the full moon; *aesar* (hidden), God; *nepos* (greediness), squanderer; *hister* (giddy, staggering), whence *histrio*, one who gesticulates, an actor; *læna* (colored), a tunic; *lucumo* (possessed by a spirit), a Tuscan prince; *lituus* (bent), staff of the augurs; *lars*, protecting divinity; *sez*, daughter; *qil* (rolling, swift), year (some read *ril*, owing to the identity of the sign for both *q* and *r* in the great Perusian inscription); *skal*, lion; *tla*, lamb; *us*, altered into; *tinsk fil*, bites terribly; *efeti*, I rest, my peace; *teuflce*, thou risest fire-like. Of the 9 inscriptions explained by Stickel, the greatest is that on the square sepulchral stone discovered in 1822 and preserved at Perugia. It has 24 lines in front and 21 on one of the other sides, containing 658 letters. It is a monument of the expulsion of 12 and afterward of 10 *Raene* (Etruscans) by the Veltinas from the Apennines into the lower country, and of the occupation of the lands so vacated by the *Clenei* (Clusii), about the time of the foundation of Rome. That on the pallium of a man "deprived of eyes" by a Clusian about the time of Porsena (506 B. C.); the tablet represents "an old man being tied to a tree, preparatory to being flayed" alive. Of several hundred short funeral inscriptions known, 17 have been published as proofs of the Semitic character of the language; some of them are bilingual, with a Latin part giving the name of the deceased, while the Tuscan expresses such sentences as: "While we depart to naught our essence ascends;" "We rise like a kite," &c. Out of 10 mementoes of funeral sacrifices we quote the following: "Raise the soul as fire! it departs for ever;" "We ascend to our ancestors." Beside sepulchral urns, there are inscriptions on candelabra, drinking cups, and other utensils, all of great antiquity, testifying the efficiency of the Tuscans in the arts, independent of the Greek imitations of their works. Some of these monuments have been found in Campania, some in Etruria proper, and in other countries formerly inhabited by Etrurians. One occurs as far N. E. as Carinthia, on a mossy rock in a forest near Wurumbach; it runs thus: *Koc'é'tiuoifia nzirios'igtib* ("Bring hither the weary at seeing this writing"). This inscription appears to be of later date than any other. Of inscriptions on coins there are but few. Under the Roman emperors the haruspices used Latin versions of Etruscan rituals. Such were the *libri Etrusci*, *Etruscæ disciplinæ* (religion); rituals on the manner of building cities, temples, and altars; on the sanctity of walls and gates; on the *tribus*, *curiæ*, military order, &c.; *fulgurales* and *haruspicini*, and the *prodigia*; *Tagetici*, on the ceremonies (*cæremoniæ*, from *Cære* or Agylla) of the earth-born god Tages; *acheruntici*, on conciliation with the gods, &c. There were also ancient pastoral and augural songs. Varro preserved some fragments, and mentions Etruscan tragedies by Volumnius. The scoffing and jocular Fescennine (so called from Fescennium, a city of Etruria) and Saturnalian verses were also derived from the Tuscans. Cicero, Aulus Gellius, Cæcina, Nigidius Figulus, and some later Romans translated and explained

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various Etruscan books, of which we have but fragments.—In addition to the authorities mentioned above and in the article on ETRURIA, see Gori, *Difesa dell' alfabeto degli antichi Toscani* (Florence, 1742); J. C. Amaduzzi, *Alphabetum Veterum Etruscorum* (Rome, 1775); G. B. Vermigioli, *Saggio di congetture*, &c. (1824); J. Kollar, *Staroitalia Slavjanska* (Vienna, 1853); Mommsen, *Nord-Etruskische Alphabete*; Dempster, *De Etruria Regali* (Florence, 1723–'4); Winckelmann (on art), Uhden, and Dr. Frick, in archæological and philological periodicals.

ETTY, WILLIAM, an English painter, born in York, March 10, 1787, died there, Nov. 13, 1849. He was the son of a baker, and at the age of 12 was apprenticed to a printer at Hull, with whom he remained 7 years. In 1807 he was admitted a student in the royal academy, and was also a private pupil of Sir Thomas Lawrence for a year. He repeatedly sent pictures to the exhibitions of the royal academy and the British gallery, which were rejected. In much despondency he sought the advice of his old master, who told him that he had a good eye for color, but was lamentably deficient in all other respects. Profiting by this hint, Etty worked harder than ever, and in 1811 had the satisfaction to see one of his pictures on the academy's walls. By degrees he succeeded in building up a reputation, and in 1821 his "Cleopatra's Arrival at Cilicia," in which the nude female form was depicted with great correctness, and with a voluptuous glow of color, brought him into considerable notice. In 1822 he went to Italy, and spent many months in the study of the Venetian colorists. In 1848 an exhibition of his works was opened in London, prominent among which were the 9 great paintings which he considered the triumphs of his artistic career, and in which he says he aimed "to paint some great moral on the heart." They comprise "The Combat," the 3 "Judith" pictures, "Benaiah, David's Chief Captain," "Ulysses and the Sirens," and the 3 pictures of "Joan of Arc." Etty is considered one of the chief artists of the modern English school. His life has been written by A. Gilchrist (2 vols. 8vo., London, 1855.)

ETYMOLOGY. See LANGUAGE.

EUBŒA. See NEGROPONT.

EUBULIDES OF MILETUS, the best known of the disciples of Euclid of Megara, flourished about the middle of the 4th century B. C. His life was a struggle against Aristotle, in which by a captious logic he sought to prevail against good sense. A partisan of the Megaric principle, that there is nothing real but what is always one, simple, and identical, he immediately found an adversary in the founder of the great contemporary school which made experience the condition of science. He attacked the peripatetic doctrine, like Zeno of Elea, by striving to show that there is none of our experimental notions which does not give place to insolvable difficulties. To this end he invented his famous sophisms, of which the following is a specimen: "Some one lies, and says that he lies. Does he lie, or not? By the hypothesis, he lies. Then he does not lie, for what he says is true. Thus he lies and does not lie at the same time, which is contradictory."

EUBULUS, an Athenian poet of the middle comedy, flourished about 376 B. C. He wrote 104 plays, chiefly on mythological subjects, many of them containing parodies of passages from the tragedians. The fragments of his works which remain have been edited by Meineke, and are marked by a peculiarly pure diction.

EUCHARIST (Gr. *εὐχαριστία*, thanksgiving), a name frequently given to the sacrament of the Lord's supper, either in allusion to the praises with which the early Christians used to celebrate it, or because at its institution our Saviour "gave thanks" in blessing the bread and wine. (See LORD'S SUPPER.)

EUCLID, the most celebrated of ancient geometers, flourished at Alexandria, in the reign of the first Ptolemy, in the 3d century B. C. The Arabic historians give many unauthenticated particulars of his life; but it is only certain that he dwelt first in Greece and then in Egypt, and probable that he studied at Athens under the successors of Plato, and then passed over to Alexandria. There he founded the mathematical school, and was remarkable for his zeal in science, his affection for learned men, and his gentle and modest deportment. Ptolemy having asked him if geometry could not be made easier, he made the celebrated answer that there was no royal road to geometry. To appreciate the merit of Euclid, the state of geometry before him should be considered. Proclus gives the improbable legend that the Egyptians were obliged to invent geometry in order to find again the boundaries of their fields, effaced by the inundations of the Nile. Thence it was brought to Greece by Thales, but it was first raised to a liberal science, and applied to the solution of speculative and theoretical problems, by Pythagoras. Hippocrates was the first to write on elements. Plato, without writing particularly upon geometry, contributed much to its progress by his use of the analytic method, and by the mathematical style of his books, and new theorems were added by numerous lesser philosophers. At the advent of Euclid, something had been written on proportion, incommensurables, loci, solids, and perhaps conic sections; and the important property of the right-angled triangle had been discovered. It was the glory of Euclid to unite in a single book all the discoveries of his predecessors, and to add several new ones of his own. He surpassed all other geometers of antiquity in the clear exposition of his theorems and the rigid order of his demonstrations. The "Elements" of Euclid belong both to geometry and arithmetic. They consist of 13 books written by Euclid, and 2 others written probably by Hypsicles; and they may be divided into 4 parts, of which the 1st, comprising the first 6 books, treats of the properties of plane figures, and presents the theory of proportions; the 2d gives, in the 3 following books,

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the general properties of numbers; the 3d, consisting of the 10th book, is the development of all the power of the preceding ones, and is occupied with a curious and profound theory of incommensurable quantities; and the remaining books are on the elements of solid geometry, and were so much studied among the Platonists as to receive the name of the Platonic. The best known of the treatises of Euclid, after the "Elements," is the "Data." By this name are designated certain known quantities which by means of analysis lead to the discovery of other quantities before unknown. One hundred propositions are here collected which are the most curious examples of geometrical analysis among the ancients. Newton highly valued them, and Montucla styles them the first step toward transcendental geometry.—The history of the works of Euclid is the history of geometry itself, both in Christian and Mohammedan countries, until after the revival of learning. They were commented upon by Theon and Proclus, and became the foundation of mathematical instruction in the school of Alexandria. Of the numerous editions and commentaries among the Orientals, that of Nasireddin, a Persian astronomer of the 13th century, was the best. The "Elements" were restored to Europe by translation from the Arabic, the first European who translated them being Adelard of Bath, who was alive in 1130, and who found his original among the Moors of Spain. Campanus, under whose name this translation was printed, was for a long time thought to be its author. The Greek text was first published in 1533 by Simon Grynœus at Basel, and in subsequent editions was corrected by comparison of manuscripts. Since then the work has been published in a great variety of editions, and translated into all the European and many oriental languages. The English adaptations by Simson and Playfair have been widely received as text books in geometry.

EUCLID OF MEGARA, a disciple of Socrates, born about 440 B. C. His first master was Parmenides; afterward he became a devoted disciple of Socrates, at whose death, according to Plato, he was present. But notwithstanding his affection for his second teacher, he retained from the Eleatic school an invincible tendency to subtlety, and it was said of him by Socrates that he knew how to live with sophists, but not with men. After the death of Socrates, his disciples, fearing for their lives, fled from Athens; and at Megara, in the house of Euclid, they found an asylum and a new centre for their studies. Plato himself was an ardent attendant upon Euclid, who taught that the essence of good was unity, unity so entire as to embrace immobility, identity, and permanence. Hence the sensible world has no moral character and no relation to good. He taught also that being consists only in unity, identity, and permanence, and hence the sensible world has no part in existence. Being and good are thus the same thing, namely, unity; good therefore alone exists, and evil is but the absence of existence. It does not follow, however, that there is but a single being and a single sort of good, for unity may be found contained in various things. Euclid expressly taught that in spite of their unity, being and good clothe themselves in different forms, present themselves under different points of view, and receive different names, as wisdom, God, intelligence, and others. Euclid also anticipated Aristotle in distinguishing the act from the power, and resolved according to his ideas of being the relation between the two.

EUDIOMETER (Gr. *εὐδία*, pure air, and *μέτρον*, measure), the name given to an instrument invented by Priestley for determining the proportion of oxygen in the air, in the belief that on this depended its salubrity. Many other instruments have since been invented for estimating the amount of oxygen in gaseous mixtures, and the name is retained for these, though it has no longer its original significance. In the application of the instrument for estimating oxygen, the gas is made to unite with some substance, as phosphorus, introduced into the gaseous mixture, which is contained in the upper end of a graduated glass tube inverted over mercury. The diminution of bulk caused by the absorption of the oxygen indicates its quantity. In other forms a known quantity of hydrogen is introduced and the mixture fired by an electric spark produced by means of two wires being melted into the sides of the tube and nearly meeting each other within. In this case the tube is made very thick to withstand the explosion. Every two volumes of hydrogen consume one of oxygen, whence the quantity of the latter may be estimated.

EUDOCIA, originally named ATHENAIS, a Grecian maiden, who became the wife of the emperor Theodosius II., born in Athens about A. D. 394, died in Jerusalem about 461. She was instructed by her father, the sophist Leontinus, in the religion, literature, and science of the pagan Greeks, and was as remarkable for her personal beauty as for her learning. Leontinus at his death divided his property among his sons, saying that the merits of his daughter (to whom he left only 100 pieces of gold), which raised her so much above her sex, would be sufficient for her. Thus disinherited, and having sought in vain from her brothers a share in the paternal heritage, she went with an aunt to Constantinople to solicit the cancelling of the will. She procured an audience of Pulcheria, sister of the young emperor Theodosius II., and regent in his name, who was so charmed by her wit and beauty that she secretly destined Athenais to be the wife of her brother. Theodosius himself, then 20 years of age, was captivated at the first interview, and Athenais renounced the religion of her father, was baptized by the patriarch of Constantinople, from whom she received the name of Eudocia, and was married to the emperor in 421. She received the title of Augusta in 423, after having given birth to a daughter, and she requited the unkindness of her brothers by making them consuls and prefects. During

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the first 20 years after her marriage Eudocia took little part in public affairs, which remained in the hands of Pulcheria. She translated parts of the Old Testament into hexameter verses, and a life of Jesus Christ composed in verses taken from Homer is attributed to her. She also celebrated in verse the Persian victories of Theodosius, and the legends and martyrdom of Saint Cyprian. She at length supplanted Pulcheria, and ruled the empire for 7 years, from 443 to 450. Her court was filled with learned men, with one of whom, Paulinus, a companion of her early studies in Athens, she cherished an intimacy which roused the jealousy of her husband, and Paulinus was banished to Cappadocia, where he was soon afterward assassinated. The Eutychian discussion was now vexing the church; Pulcheria and Eudocia adopted different views, and in the alternate ascendency of the two parties, first the former and then the latter was exiled. Eudocia retreated to Jerusalem, where, however, the jealousy of the emperor or the vindictive spirit of Pulcheria pursued her, and two priests who shared her exile were slain. The exasperated empress immediately put to death the agent of the emperor; and being now stripped of all the honors of her rank, she passed the remainder of her life in exercises of piety and charity. The influence of St. Simeon Stylites and of Euthymius, another eminent ascetic, induced her at last to abandon Eutychianism. She died protesting to the last the innocence of her life.

EUDOXIA, daughter of Theodosius II. and Eudocia, born in Constantinople in 422, died about 463. She was married to her cousin Valentinian III., emperor of the West, after whose death, by the hands of emissaries of the senator Maximus, she was constrained to espouse the latter. Maximus subsequently had the folly to reveal to her the part which he had taken in the murder of Valentinian, and when the time for vengeance seemed to her to have come she invited to Italy Genseric, king of the Vandals, at whose approach Maximus was murdered Genseric delivered Rome to pillage, and bore away with him to Africa Eudoxia and her two daughters. They were released after a detention of 7 years, during which one of the daughters was forced to marry the son of Genseric.

EUDOXUS OF CNIDUS, a Greek natural philosopher, born about 409, died about 356 B. C. He studied under Archytas and Plato, travelled in Egypt, and returned to Cnidus in 359, founded a school, and built an astronomical observatory. Though he seems to have treated the whole circle of the sciences, he particularly excelled in geometry and astronomy, and is called by Cicero the prince of astronomers. In his astronomical system the earth was the motionless centre of all the celestial revolutions. The movements of the sun, moon, and 5 planets resulted, according to him, from the combined revolutions of concentric spheres, of which there were 3 each for the sun and moon, and 4 for each of the planets. Every planet occupied a part of the heavens by itself, and was surrounded by moving spheres, whose mutually modified motions made the orbit of the planet. He first fixed the length of the year as adopted in the Julian calendar at 365¼ days, and introduced celestial spheres or globes. In music he studied the numerical relations of sound according to the rapidity of the vibration of the chords. In arithmetic he added 8 kinds of proportion to the 3 kinds known before him.

EUDOXUS OF CYZICUS, a Greek navigator of the 2d century B. C. Expeditions from Egypt to India had for a time ceased, when he revived them under the reign of Ptolemy Euergetes. His bold enterprise in seeking the most direct route to India, to which he made two voyages, and whence he seems to have been the first to bring diamonds, and in attempting to circumnavigate Africa by the west, caused him many persecutions, and his reputation has been obscured by the fables with which Nepos and Mela sought to embellish it.

EUFAULA, a post village of Barbour co., Ala., beautifully situated on the right bank of the Chattahoochee river; pop. in 1853, 3,000. It stands on a high bluff, 200 feet above the water, and contains several churches and newspaper offices, and many stores. An active and constantly increasing trade is carried on by means of the river, which is navigable to this point from November to June. It is the principal shipping point for the produce of the surrounding plantations, and exports annually about 20,000 bales of cotton.

EUGENE, FRANÇOIS, called Prince Eugene of Savoy, born in Paris, Oct. 18, 1663, died in Vienna, April 21, 1736. His parents were Eugene Maurice, count of Soissons, a grandson of Charles Emmanuel I., duke of Savoy, and Olympia Mancini, one of the nieces of Cardinal Mazarin. He was intended for the church, for which he had no taste, but devoted himself to military reading. Louis XIV. refused him a regiment, and he encountered the enmity of Louvois—a refusal and an enmity that were to cost France dear. He entered the Austrian service, and made his first campaign against the Turks in 1683, so distinguishing himself that he was promoted to the command of a dragoon regiment. He was present at the battle of Vienna. Further service led to further promotion, and he held the rank of major-general at the siege of Belgrade, in 1688. Louvois now required all Frenchmen serving in foreign armies to return home, on pain of banishment. Eugene refused to obey, and declaring that he would return to France in spite of the minister, remained in the imperial service. He was sent to Savoy in a diplomatic capacity, but he served as a soldier under the duke of that country in several campaigns, being his lieutenant when he invaded France in 1692. He was brevetted field marshal, and after his return to Vienna was placed at the head of the army in Hungary. Sensible of the folly he had committed, Louis XIV. now made him great offers on condition

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of his entering the French service. These offers he would not listen to, but took command of an army that was employed against the Turks. He completely outgeneralled the enemy and exterminated their army at Zentha, Sept. 11, 1697, winning one of the greatest victories of that age. The action was fought in violation of orders, which his enemies at court turned to account. He was placed under arrest, and it was intended to send him before a council of war; but the emperor changed his mind and restored him to his command. He accomplished nothing more of importance, and peace was made in 1699. When the war of the Spanish succession commenced in 1701, Eugene was sent to Italy, where he showed himself superior to Catinat, and won great successes. Villeroi, Catinat's successor, he defeated at Chiari, and compelled him to abandon the territory of Mantua. In Jan. 1702, he attacked the French in Cremona, and though repulsed, captured their general. In Vendôme he found a worthy antagonist, and they fought the bloody drawn battle of Luzara, Aug. 1, 1702. Appointed president of the war council, and afterward sent against the Hungarians, Eugene did nothing more equal to his reputation until 1704, when he first served in company with Marlborough. They fought and won the battle of Blenheim, Aug. 13, Eugene's part in the action being important. He was then sent to Italy, and was defeated at Cassano (Aug. 16, 1705) by Vendôme, being twice wounded. When the French army passed into the hands of the duke of Orleans and Marshal Marsin, and were engaged in besieging Turin, Eugene, at the head of only 30,000 men, attacked their 80,000 men, and defeated them, Sept. 7, 1706. He was wounded in the action. He was rewarded with the government of the Milanese. The next year he made an attempt upon Toulon, but failed. He was then employed at the German court in hastening preparations for the next campaign; and in that campaign he helped Marlborough to win the battle of Oudenarde, and took Lille. He was at the battle of Malplaquet, Sept. 11, 1709, and aided to gain the field for the allies. On the decline of Marlborough's power in 1711, he visited England, hoping to gain her back to her former position in the alliance, but ineffectually. His own exertions against the French were fruitless, and in 1714 the peace of Rastadt put an end to the war between the empire and France. After residing at Vienna for some time, where he was much consulted by the emperor, he was appointed to the command of the army that was to act against the Turks, Austria aiding the Venetians in accordance with Eugene's recommendation. He defeated them at Peterwardein, Aug. 5, 1716, with immense slaughter. The next year he advanced against Belgrade, and was there assailed by very superior forces, some accounts say 6 to 1; but at a time when his destruction was regarded as inevitable he assailed the enemy, and inflicted upon them the greatest defeat they ever experienced, Aug. 16, and took the city on the 22d. He was wounded in the battle. In 1718 he hoped to dictate peace at Constantinople, but the treaty of Passarovitz stopped his career of conquest. He was rewarded by a pension, an estate worth 300,000 florins per annum, and the vicar-generalship of Italy, having previously occupied the office of governor of the Netherlands. He held for many years nearly the same position in Austria that Wellington subsequently held in England. Yet he had bitter enemies, toward whom he was very forbearing. "His even temper," says Vehse, "never forsook him for a moment. He bore all the intrigues of his enemies, as well as their open and clumsy attacks, with imperturbable equanimity and patience; and showed himself so forbearing to his colleagues in the field and in the cabinet that not one case is known of his ever having taken revenge on his enemies." In many of his political opinions he was in advance of his age. He saw the error of the house of Austria in encouraging the growth of Prussia, and in conferring on her chief the royal title. He favored an alliance with France, thus anticipating the policy of Kaunitz. He fostered literature, science, and art, and corresponded with Boerhaave, Montesquieu, and Leibnitz, the last named being his personal friend; and he made great collections of MSS., books, and pictures. The last military service in which he was engaged was that which grew out of the war of the Polish succession, in 1734, when he commanded an army against the French on the Rhine. There was not much fighting and no pitched battle. The heir apparent to the Prussian crown, Prince Frederic, afterward Frederic II., then served under him, and the first hostile cannon he ever heard, at Philipsberg, were the last heard by Eugene. The future conqueror of Rossbach pronounced his commander to be only "the shadow of the great Eugene." He was found dead in his bed in the morning, after having played piquet the previous evening. His funeral was one of the most magnificent ever known, 16 field marshals carrying the coffin, and the emperor attending as a private mourner. He was never married, but he was supposed to have been the father of the two sons of the countess Batthyanyi. Eugene is considered one of the 5 greatest generals of modern times, the other 4 being Napoleon, Wellington, Marlborough, and Frederic the Great.

EUGÉNIE MARIE DE GUZMAN, countess of Teba, empress of the French, born in Granada, Spain, May 5, 1826. She is the 2d daughter of the count of Montijo, a Spanish grandee, whose ancestors emigrated in the 14th century from Genoa to Spain. The ancestors of her mother, Marie Manuela Kirkpatrick of Closeburn, who was born in Andalusia, were Roman Catholics of Scotland, and fugitives from that country after the downfall of the Stuarts. The countess of Teba was educated in France and England, travelled extensively, and while in Paris (1851) she became acquainted with the present emperor of France, who married her,

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Jan. 30, 1853. She was delivered of a son, Napoléon Eugène, March 16, 1856, the heir apparent of the French empire. She is remarkable for her beauty and accomplishments. On the emperor's departure for the seat of war in Italy, he appointed her regent, May 3, 1859.

EUGENIUS, the name of 4 popes. I. Born in Rome, died about 658. When Martin I. was banished by the emperor Constans II. in 654, Eugenius became vicar-general of the church, and in the same or the next year was chosen pope. He was distinguished for piety, and like his predecessor had trouble with the emperor. He was canonized. II. Born in Rome, succeeded Pascal I. in 824, died in 827. He was opposed by an anti-pope, and to quell the schism which followed, the emperor Louis the Good sent his son Lothaire to Rome. Eugenius held a council in which it was decreed that every bishop and clergyman should have in his house a master to teach the people and explain the Scriptures. He seems to have been a man of humility, simplicity, and learning, but is said to have countenanced the ordeal of cold water, instituted in his time, and condemned by the council of Worms in 829. III. Born in Pisa, succeeded Lucius II. in 1145, died in Tivoli, July 8, 1153. He was a Cistercian monk, a friend and disciple of St. Bernard, and assumed the tiara at a troubled period. His predecessor had been killed in a riot, the senate had declared its independence of the pope, a patrician had been chosen, and Arnold of Brescia was at the same time exciting the people by his preaching. The Romans demanded the pope's sanction to the acts of the senate, and Eugenius rather than yield retired to Viterbo almost immediately after his election. He enlisted the arms of the people of Tivoli, gained a partial success, and afterward went to France, where he held a council at Rheims in 1148, and another at Treves. With the assistance of Roger, king of Sicily, he subdued the Romans the following year and returned to his capital, but was again driven out and withdrew to Campania. In 1152 he made a compact with Frederic Barbarossa, but before the emperor could fulfil his promise to reinstate him at Rome the pope died. St. Bernard addressed to Eugenius his treatise *De Consideratione*. IV. Gabriele Condolmero, born in Venice, succeeded Martin V. in 1431, died in Rome, Feb. 23, 1447. He was a nephew, or according to some a son of Gregory XII., who was required to abdicate by the council of Constance. He was a Celestine monk, became bishop of Sienna, and was afterward cardinal and legate to Bologna. He was a man of impetuous temper, whose reign was unfortunately cast in a time which tried that temper to the utmost. One of his first acts in the pontificate was to charge the Colonnas, the nephews of his predecessor, with robbing the papal treasury; and having by this rash though probably just accusation gained the enmity of one of the most powerful families of Rome, he found himself, on the outbreak of a revolt in his states, unable to raise either money or troops. The Colonnas paid dearly for their resistance to the demand for restitution. More than 200 of their partisans were put to death, and the arms, monuments, and dwelling of Martin V. were destroyed. The Colonnas called in the aid of the prince of Palestrina, who entered Rome at the head of an army; but Eugenius, having secured the help of Florence and Venice, beat him in a hard battle, and imposed his own terms upon the conquered. He now gave his attention to the Hussites and the council of Basel. The Hussites scattered his armies, but he would make no peace with them, and when news reached Rome that a truce had been concluded with the heretics he ordered it to be broken. With the council he had no less trouble than with the Hussites. Dec. 11, 1431, he published a bull dissolving the assembly, which was answered by a decree of the fathers, asserting their own supremacy over the pope, and summoning him to appear before them. After 2 years' delay, he was induced by the emperor to be present at the council. On the emperor's death quarrels broke out again, and Eugenius, having a second time dissolved the council of Basel, called a new synod at Ferrara. This produced a schism. A few prelates and many of the inferior clergy continued to sit at Basel, deposed the pope, and elected an anti-pope, Amadeus VIII., duke of Savoy, who took the name of Felix V. The schism lasted until after the death of Eugenius. The council of Ferrara gave its attention to a project for the union of the Greek and Latin churches, which the pope had much at heart. The emperor John Palæologus, the patriarch of Constantinople, and 21 bishops arrived at Ferrara in March, 1438, but a pestilence forced them to remove their sessions to Florence, where after much discussion the articles of union were agreed upon, July 6, 1439. The Greek people, however, never accepted the decree, and the separation between the churches continued in effect as wide as ever. Meanwhile Eugenius experienced serious temporal difficulties at home. The Romans broke out into rebellion, set up a republic, and deposed all the papal officers. The pope took refuge in the church of St. Chrysogonus, and some accounts even say that he was thrown into prison. He escaped to Ostia in disguise, and thence went to Florence, while his minister Vitelleschi, whose cruelties are said to have caused the revolt, quelled the insurrection, and punished the leaders with extreme severity. Beside the troubles which we have mentioned, Eugenius had to witness the devastations of the Turks, and was charged with being the indirect cause of the disasters which they inflicted upon the Hungarians and Poles. The legate cardinal Julian had counselled the Christians to break their truce with the Ottomans, but whether Eugenius was answerable for the advice is not agreed. The pontiff's character has engaged the attention of historians. He is praised for modesty, zeal, courage,

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patronage of art, and many personal virtues, and is accused on the other hand of inordinate ambition and haughtiness of spirit.

EULENSTEIN, KARL, an eminent performer on the Jews-harp, born in Heilbronn, Würtemberg, in 1802. While a child he showed a decided taste for music, and at 6 years of age constructed a violin, on which he soon gained a tolerable degree of skill. At 12 he was apprenticed to an iron monger, who, disliking music, refused to allow him to play upon any instrument, and took from him successively his violin, French horn, flageolet, and guitar. In despair Enlenstein resorted to the Jews-harp, an instrument he had been accustomed to sell at a penny each, and soon discovered that it was capable of a variety of tones and modulations of which he had never dreamed. He devoted 4 years of assiduous practice to the instrument, on which he acquired an astonishing skill, and succeeded in tuning a series of harps, whereby he could command a large scale, and modulate with truth and accuracy in every variety of key. For several years he passed a nomadic life of great privation as a performer on the Jews-harp in various parts of Germany, and finally settled in Stuttgart, where he played before the queen of Würtemberg, who gave him letters to influential persons. In 1825 he arrived in London, and excited much attention by his performances. Soon after his teeth became so much decayed by the action of the iron tongue of the harp that he was obliged to give up playing and devote himself to teaching the guitar. Subseqnently a covering was made for his teeth by a dentist, by which he has been enabled to resume his performances on the Jews-harp.

EULER, LEONHARD, a Swiss mathematician, born in Basel, April 15, 1707, died in St. Petersburg, Sept. 7, 1783. He studied first under his father, a Protestant clergyman, and afterward at the university of Basel, where he formed a friendship with 2 of the Bernouillis, 3 of which family were officers of the university. Euler's genius was soon diverted from the church, for which he was intended, to philosophical pursuits. At the age of 19 he was graduated, after having already attracted the notice of the French academy of sciences by a memoir upon some points of naval architecture. In the following year, being disappointed in his wish for employment at the university, he repaired to St. Petersburg, where, his friends the Bernouillis having professorships, he had hopes of the patronage of the empress Catharine I. She died before his arrival, and Euler became so straitened in circumstances as to have been on the point of enlisting in the Russian navy as a common sailor. This step was fortunately prevented through the friendship of Daniel Bernouilli, who at length obtained for him the professorship of natural philosophy. In 1733, on the retirement of this friend from the academy of St. Petersburg, Euler became professor of mathematics. He labored in his new calling with indefatigable industry, and exhibited the most astonishing powers of mind. In 1740 he gained the prize of the Paris academy, for an investigation of the natnre of tides. Meanwhile his publications on the nature and propagation of sound, on curves, on the integral calculus, the movement of celestial bodies, &c., had already gained him wide reputation. In 1741, at the invitation of Frederic the Great, he left St. Petersburg for Berlin. The despotism of the Russian government had never perhaps been agreeable to a man of such liberal principles; and it is said to have added to his habits of silent thought and study. His reserve attracted the observation of the Prussian queen dowager, who inquired into its cause. "Madam," Euler is said to have replied, "I have been living 13 years in a country where men who speak are hanged." He remained at Berlin 25 years, nntil 1766, during which period he lost his mother, who had lived with him. His wife, whom he had married in St. Petersburg, was the daughter of a Swiss artist named Gsell. Many years later, in 1776, her annt became his second wife. His children numbered 13, only 4 of whom survived him; the eldest son being his assistant and snccessor at St. Petersburg, and the second physician to the empress Catharine II. Dnring Euler's residence at Berlin, he continued to hold his Russian appointments, and even drew a portion of their salary, receiving at the same time from all parts of Europe the most flattering marks of respect. When the dominions of Frederic were invaded by a Russian army in 1760, and a farm belonging to Euler was laid waste, the empress Elizabeth immediately reimbursed his losses. These generous acts, among other motives, induced him to accept an invitation from the empress Catharine II. to return to St. Petersburg in 1766. He had during some years previously suffered from weakness of the eyes; and soon after returning to Russia, he became so nearly blind as to be able only to distinguish very large chalk marks on a blackboard. The affection was the consequence of fever brought on by a calculation, for which his fellow academicians demanded 4 months, but which Euler completed in 3 days. He continued almost blind during the remainder of his life; but by constant exercise he acqnired a power of recollection of mathematical formnlæ and figures almost incredible. He is stated to have formed in his head and retained in his memory a table of the first 6 powers of nnmbers up to 100 (about 3,000 figures). Two of his pupils, it is added, had summed 17 terms of a converging series, and differed by a unit in the 50th decimal in the result. Euler decided the point correctly by a mental calculation. Some of his most profound and valuable works were composed after his loss of sight; among them, his "Elements of Algebra," and "New Theory of the Motions of the Moon." His studies were never relaxed, until cut off by his sudden death while conversing with a pupil on Herschel's planetary discoveries. In more than 50 years of incessant labor, Euler had composed 30 sep-

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arate works, and more than 700 memoirs or treatises. The whole could not be contained in less than 40 large 4to. volumes. They embrace every existing branch of mathematics, and almost every conceivable application of them. They are all the original fruit of his own brain. To Euler belongs the credit of improving the analytic method, according to the system of Leibnitz and the Bernouillis, and of uniformly applying it to scientific investigations. Nor was he less remarkable for his popular expositions of the principles of his favorite science. His "Letters to a German Princess," which have been translated into English, and several times reprinted, throw a clear light on the most important facts in mechanics, optics, acoustics, and physical astronomy, and, though to some degree superseded by the progress of modern discovery, will always remain a model of perspicuous statement and felicitous illustration. His "Introduction to Algebra," translated by Prof. Farrar of Harvard college as preliminary to the Cambridge course of mathematics, has never been surpassed for its lucid and attractive mode of presenting the elements of that science. Euler was a man of simple, reserved, and benevolent mind; with a strong devotional sense and religious habit. He undertook to prove the immateriality of the soul, and had the courage to defend revelation at the court of a free thinker like Frederic II. of Prussia.

EUMENIDES, called also Erinnyes, and by the Romans Furiæ and Diræ, the avenging goddesses of the Greek mythology, daughters of night, and tormentors of the wicked both in the upper and the lower world. The Greeks dreaded to call them by an appropriate name, and therefore addressed them euphemistically as the Eumenides, or soothed and gentle goddesses. They seem to have been originally a personification of the curses pronounced upon a criminal, and are represented by Homer as resting in the depths of Tartarus till the condemnation of some person for violated pious or hospitable duties wakes them into life and activity. They then pursue the offender with the relentlessness of fate, chasing him from place to place, allowing him no peace nor rest, moved by no supplications, and supported by the goddess of justice, whose ministers they are. As described by Æschylus, snakes instead of hair enveloped their heads, their eyes were bloody, their faces black and full of hatefulness, and they bore torches and daggers in their fleshless hands. In the later poets wings were added, and their number was reduced from an indefinite number to 3, bearing the names of Tisiphone, Alecto, and Megæra. The terrific drama of Æschylus entitled "Eumenides" is said to have frightened several Athenian matrons into premature labor, and in subsequent representations upon the stage and in art their appearance was greatly softened down.

EUNAPIUS, a Greek sophist, physician, and biographer, born in Sardis, in Lydia, A. D. 347, died about 420. He was an adversary of Christianity, and an enthusiastic partisan of the emperor Julian. At the age of 16 years he went to Athens, where, after 4 years' study, he was admitted to know the secrets of the theurgic doctrine of Iamblichus, and was initiated into the Eleusinian mysteries. He returned to Sardis as a teacher of rhetoric, and studied medicine. There remains from him a book entitled "Lives of the Sophists and Philosophers," which gives the history not only of the philosophers, but of the physicians and rhetoricians, and of nearly all those who became known in science and letters from the beginning of the 3d to the end of the 4th century. The best edition is that of Boissonade (2 vols. 8vo., Amsterdam, 1822).

EUNOMIUS, a heresiarch of the 4th century, a native of Dacora in Cappadocia, who studied theology under the Arian teacher Aëtius, and was made bishop of Cyzicus about A. D. 360. His opinions were a logical exaggeration of Arianism. He was soon deposed from his bishopric, resided at Constantinople during the reigns of Julian and Jovian, and at Chalcedon during that of Valens; was banished by the last named, but soon recalled; was again banished by Theodosius the Great to Halmyris in Mœsia, driven thence to Cæsarea, and at length permitted to return to his native village, where he spent the remainder of his life, and died at an advanced age. His works were ordered by imperial edicts to be destroyed, but there remain of them a "Confession of Faith," which was presented to the emperor Theodosius at Constantinople in 383, and an "Apologetic Discourse," a famous treatise, of which St. Basil wrote a refutation in 5 books. His disciples were called Eunomians and also Anomœans (Gr. *ανομοιος*, dissimilar), because, unlike the Arians or Homoiousians and the Athanasians or Homoousians, they affirmed that the Son and Holy Spirit were neither identical nor similar in essence with the Father. They acknowledged the Father as supreme, eternal, and distinct; the Son as generated from the Father, and the Holy Spirit as generated from the Son. Like their founder they were accustomed to subtle speculations upon the divine nature, the incomprehensibility of which they denied. They rejected mysteries, and opposed the honors rendered to martyrs and to the relics of saints.

EUNUCHS (Gr. *ευνουχος*, from *ευνη*, a bed, and *εχω*, to guard), emasculated men employed in the East from time immemorial to take charge of women. According to Ammianus, the practice of castration was originated by the cruel ingenuity of Queen Semiramis. A product of oriental polygamy, jealousy, and despotism, eunuchs were early common in Egypt, Syria, Asia Minor, and the neighboring countries, were introduced thence into Greece and Rome, among the later Romans were admitted into the families of senators and emperors, and by their skill in flattery and intrigue often established their power at court, especially under the Byzantine empire. The Romans ingeniously devised a method of making castration more

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or less complete. Gibbon affirms that the general history of Persia, India, and China proves that the power of the eunuchs has uniformly marked the decline and fall of every dynasty. They are still employed in the East as guardians of the harem, black slaves from Ethiopia being generally preferred. The example of Origen and the sect of the Valesians mark their appearance in church history and discipline. With some exceptions, they have exhibited an ungenial, suspicious, supple, and treacherous character. In Rome they were not permitted by law to appear as witnesses, and in modern times the *castrati*, famous as singers for the peculiar quality and clearness of their voice, are excluded by the Catholic church from the office of the priesthood. The custom of castration for the purpose of improving the voice came into use in the middle ages, chiefly in Italy, where, in the 18th century, it was estimated that 4,000 boys annually suffered in order to become singers in operas, at concerts, and in the celebration of the mass. The operation checks the growth of the beard, and gives a feminine character to the physiognomy and general physical development, though when performed in early youth it tends to increase the stature of the man. The eunuchs of the Turkish harems are mostly made so in upper Egypt, near Nubia, at a village where the operation of castration is performed by Coptic priests. It is stated that about 1 in 7 of the boys die in consequence of the operation.

EUPATORIA (formerly *Koslov*), a seaport town in the Russian government of Taurida, on the W. coast of the Crimea, and the capital of the district of the same name, situate on the N. shore of the bay of Kalamita, in about lat 45° 14′ N., long. 33° 25′ E., about 40 m. from Simferopol, and 44 m. from Sebastopol. Under the Tartars it was one of the most prosperous and populous towns in the Crimea. Before the Russian occupation of the Crimea, when the name of Eupatoria was given to the town by Catharine II., it had a population of above 30,000. According to the census of 1851, it had only 8,200, but it is now (1859) estimated at 14,000, chiefly Tartars and Caraite Jews. It has a considerable trade in grain, and some trade in hides, butter, wax, &c. The export of salt, which is drawn from adjoining salt lakes, and from which the Tartars formerly derived great profit, has fallen off considerably since the increase of the export duties. Butter, felt stuffs, and the black lambskins known in England as Astrakhans, are prepared in the town. The port is shallow, but safe, and never frozen up. To supply the town with water an Artesian well has been dug by order of the Russian government, 460 feet deep, and furnishing a daily supply of 120,000 gallons. The principal buildings are a Russo-Greek church, an Armenian church, 2 synagogues, and about 13 mosques, the chief of which, built by Devlet-Ghiri Khan in 1552, is the finest in the Crimea. On Sept. 14, 1854, the English and French effected a landing in the bay of Eupatoria, with about 60,000 men. The town was provided with fortifications by order of Omar Pasha, who was at the head of the Turkish army there, in 1855. The Russians made an ineffectual attack on the town, Feb. 17, 1855. It was evacuated by the allies after the ratification of the peace of Paris, May 30, 1856.

EUPHRATES (Turk. *El Frat*), called also by the natives of the country through which it flows the Murad, the largest river of western Asia, has its source in the mountains of Armenia, N. E. from Erzroum, where it is formed by the junction of 2 rivers, the Kara-Soo and the Murad, near Kebban, in lat. 39° N. and long. 38° 30′ E. It flows S. W. past Samosta, where a chain of high mountains prevents its further progress toward the Mediterranean. It then turns its course to the S. E., traverses a wild defile of Mount Taurus, separates Anatolia from Turkish Armenia, keeps its way without deviation till near its junction with the Tigris, and the united rivers fall, under the name Shatel-Arab, into the Persian gulf. Its total length is nearly 1,800 m., its average breadth about 200 yards, and its depth from 12 to 30 feet. The upper part of its course lies amid lofty mountains, and near the village of Pash-tash it plunges through a gorge formed by precipices more than 1,000 feet in height, and so narrow that it is bridged at the top. It then enters the plains of ancient Babylonia, where the swiftness of its current is diminished, and where in ancient times numerous canals extended from its banks to irrigate the neighboring country. It extricates itself from the marshes of Lemloon just before reaching Korna, the point of its union with the Tigris. It is navigable both below and above the cataracts which it forms in the passes of the Taurus, though numerous islands, shallows, and rapids make its navigation in many places difficult. Its waters are subject to periodical increase from the melting of the snow on the mountains along the upper part of its course, and its inundations were anciently of great advantage to the agriculture of the level districts through which it passes. Under the misrule of the Turks, however, the canals and embankments which regulated the inundations have been neglected. The Euphrates is linked with the most important events in ancient history. It is mentioned in the Bible as one of the 4 rivers of paradise, and is often named the great river. On its banks Nimrod is said to have founded the city of Babylon, which was for ages the seat of a great empire; and at Cunaxa terminated the ill-starred expedition of Cyrus the Younger, and began the famous retreat of the 10,000 Greeks under Xenophon. It was for a long time the eastern boundary of the Roman empire. In recent times the English have tried, thus far unsuccessfully, to use it as their path of communication with India. For this purpose an expedition was sent from England under command of Col. Chesney, which in 1856 descended

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the river from Bir and surveyed 509 miles of its course. (See CHESNEY.) It is a singular fact concerning the Euphrates that several thousand years ago the waters do not seem to have reached the sea at all, but were lost in marshes or consumed by irrigation, which was practised on an immense scale under the Babylonian and Assyrian sovereigns. It is certain that at a much later period the Tigris and Euphrates flowed into the sea by distinct channels. Their junction is supposed to have taken place more than 2,000 years ago.

EUPHUISM (Gr. *εὐφυης*, elegant), an affected style of speech which distinguished the conversation and writings of many of the wits at the court of Queen Elizabeth. The name and the style were derived from the "Euphues, the Anatomy of Wit" (1580), and the "Euphues and his England" (1581), of John Lilly, of which Anthony à Wood said: "Our nation is indebted for a new English in them, which the flower of the youth thereof learned." The style of these once famed books, which became the model of the wits and gallants of the time, and was almost regarded as a test of courtly breeding, was characterized by smoothness and verbal elegance, and chiefly by fantastic similes and illustrations formed by attributing fanciful and fabulous properties to animals, vegetables, and minerals. Supported by fashionable sanction, Lilly was for a time esteemed the rival of Demosthenes and Cicero in "all the partes of rhetoricke, in fitte phrases, in pithy sentences, in gallant tropes, in flowing speech." But the applause was not universal. Euphuism is ridiculed in Marston's comedy of "What You Will," in Ben Jonson's "Cynthia's Revels," and is thought to be referred to in the style of Don Armado in Shakespeare's "Love's Labor's Lost," and Sir Walter Scott in his "Monastery" makes Sir Piercie Shafton "parley euphuism."

EUPOLIS, one of the 6 Greek comic poets whom the grammarians of the school of Alexandria judged worthy of a place in their canon, born about 446, died about 411 B. C. He belonged to the old comedy, was a disciple of Cratinus, and composed 17 pieces, 7 of which were crowned. He was reputed superior to Aristophanes in elegance, and in bitter and personal jests was the rival of Cratinus. Among the objects of his satire were Alcibiades and Socrates, the former of whom, according to one report, exasperated by his attacks, threw him into the sea, where he was drowned. He is also said, with more probability, to have been killed in battle during the Peloponnesian war. The fragments of his plays have been edited by Runkel (Leipsic, 1829), and are contained in Meineke's *Fragmenta Poetarum Comicorum Græcorum* (Berlin, 1839–'47).

EURE, a N. department of France, formed in 1790 by the union of 4 ancient districts of Normandy, bounded N. by the mouth of the Seine and the department of Seine-Inférieure, E. by Oise and Seine-et-Oise, S. by Eure-et-Loir and Orne, W. by Calvados; area, 2,248 sq. m.; pop. in 1856, 404,665. It has a level surface, naturally divided into 6 plateaus by the rivers Epte, Andelle, Eure, Iton, Rille, and Charentonne, which flow through it to the Seine; and it presents well cultivated fields and enclosures, fine forests, marshes, and a few hills. Agriculture is carried to a high degree of perfection, and the vine, apple, and pear are objects of special cultivation. Its most celebrated and flourishing cloth manufactories are at Louviers. It has important copper founderies at Romilly, and manufactories of nails, pins, &c. It has considerable commerce, chiefly in its own manufactured and agricultural products. It is divided into 5 arrondissements, and forms the diocese of Evreux, which is its capital city.

EURE-ET-LOIR, a N. department of France, formed in 1790 of parts of the ancient provinces of Orléanais, Ile-de-France, and Maine, bounded by the departments of Eure, Seine-et-Oise, Loiret, Loir-et-Cher, Sarthe, and Orne, and comprised in the basins of the Seine and the Loire; area, 2,117 sq. m.; pop. in 1856, 291,074. Its general aspect is that of a plain, with slight undulations of hill and valley, and its soil is unsurpassed in fertility by any in France. Its climate is mild, with frequent rains in spring and autumn. There are but small remains of the immense forests which formerly covered its surface. Cereals, the vine, prune, pear, cherry, and apricot are cultivated. It has some cloth manufactories. It forms the diocese of Chartres, which is its capital city.

EURIPIDES, the last of the illustrious trio of the tragic poets of Athens, born, according to the almost unanimous consent of the ancient authorities, in the island of Salamis, in the 1st year of the 75th Olympiad, 480 B. C., and, as was generally believed, on the very day of the battle of Salamis (Sept. 23). The Parian marble alone carries back the date of his birth to 485, or the 3d year of the 73d Olympiad. He died in 406. The name Euripides is said to have been bestowed upon him in commemoration of the battle of Artemisium, fought not long before, near the channel of the Euripus. He was the son of an Athenian citizen named Mnesarchus, and his wife Clito, of the deme of Phlya and the tribe Cecropis, or according to others of the deme of Phyle and the tribe Œneis. His parents had left Athens on the approach of Xerxes and his Persian host, and taken refuge in the neighboring island. The condition of the family was respectable and perhaps affluent, though Aristophanes, in his comic attacks upon the poet, describes his mother as a seller of herbs; but the weight of ancient testimony contradicts these assertions and insinuations of the great comic poet. The father of the future tragedian probably returned to Athens after the Persians were driven from the country. At all events, the education of his son occupied much of his attention. There was a legend that, induced by an oracle which declared that the youth was destined to be victo-

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rious in the "crown contests," he caused his son to be trained in athletic exercises. While yet a boy, he is said to have gained the victory in the Eleusinian and Thesean contests; and at the age of 17 he offered himself at the Olympic games, but was not received. For a time he devoted himself to the art of painting, and some of his performances are said to have been seen at Megara. His genius, however, ranged through all the studies that were then cultivated at Athens. He studied rhetoric under Prodicus, the author of the admirable apologue of the "Choice of Hercules," who visited Athens as ambassador of his native city; physics under Anaxagoras, whose opinions gave a coloring to his poetry; and perhaps philosophy under Protagoras. He became an intimate friend of Socrates, who was 12 years his junior. At length, after trying his hand on other pursuits, the natural turn of his genius for tragedy manifested itself. His first piece was written at the age of 18, but there is no evidence that it was brought upon the stage. The *Peliades*, the first of his plays represented in his own name, was brought out in 455. This is not preserved. Fourteen years later, 441, he gained for the first time the first tragic prize. Ten years after this, in 431, he gained the first prize with the tetralogy, including the *Medea*, *Philoctetes*, *Dictys*, and *Theristæ*. In 428 he brought out the *Hippolytus*; in 412 the *Andromeda*; and in 408 the *Orestes*. He appears to have carried off the prize but seldom, if we consider the number of his plays—15 times according to Thomas Magister, or 5 times as others state—while he is said by some to have written 92, and by others 75 pieces, including the satyric dramas or afterpieces, with which the tragic trilogy was usually followed. Soon after the representation of the *Orestes*, Euripides appears to have accepted the invitation of Archelaus, king of Macedonia, to take up his residence at that court. He had already held possession of the Athenian stage for more than 50 years, and had written an extraordinary number of masterpieces in the art to which his life had been devoted, when he left the city which his genius had adorned, to try the hazardous and uncertain experiment of residence at a foreign court; but there were some powerful reasons which urged him to this step. The rivalries in his art, and still more the attacks to which he exposed himself by the freedom of his philosophical and religious opinions, probably embittered his life at Athens. According to tradition, Euripides was not happy in his domestic relations, but the details on this subject seem to rest on no credible authority. He was married to Chœrilla, the daughter of Mnesilochus, and by her had 3 sons, Mnesilochus, Mnesarchides, and Euripides. There are strong reasons for disbelieving the statement that he divorced his wife for infidelity; and that the second proving equally bad, he withdrew in disgust to the court of Macedonia; or that he withdrew in consequence of having detected an intrigue between Chœrilla and an actor named Mnesilochus. He lived but a short time after he went to Macedonia. According to tradition, he was torn in pieces by the hounds of the king. During his short residence in Macedonia, he acquired a great ascendency over the king, who loaded him with gifts and honors. When the news of his death reached Athens, it threw the whole city into mourning. Sophocles, then 90 years of age, was so deeply moved that he changed his garments, and required his actors to lay aside their crowns and appear in mourning on the stage. The Athenians requested that his remains might be sent home for burial; but the request was not granted. The Athenians, however, erected a cenotaph to the poet, on the road from the Piræus to Athens, and his statue was afterward set up, with those of Æschylus and Sophocles, in the Dionysiac theatre, by Lycurgus the orator, a contemporary of Demosthenes. The beautiful inscription on the cenotaph is supposed to have been written by Thucydides the historian.—Of the numerous works of Euripides only 19 entire pieces have come down to our times. Many fragments of other plays exists, and are published in the editions of his works. Of the extant pieces, the genuineness of one, the *Rhesus*, has been called in question. Seventeen are tragedies, and two, the *Cyclops* and the *Alcestis*, were intended as afterpieces, like the satyric dramas (of which the *Cyclops* is indeed the only remaining specimen) in tetralogies. The earliest of all is the *Alcestis*, which was brought out in 438; the date of the *Orestes* is the latest ascertained, 408; but several of his pieces were brought out after the poet's death by his son Euripides. The best editions of Euripides are those of Beck (Leipsic, 1778–'88), of Matthiæ (Leipsic, 1813–'29), and the Glasgow edition in 1821. The edition of Paley, now passing through the press in London—two volumes of which have already appeared—will certainly be the most beautiful, and probably the most useful. The whole works of Euripides have been translated into English verse by Potter (2 vols. 4to., London, 1781–'4; 2 vols. 8vo., Oxford, 1814), and into prose by Buckley in Bohn's "Classical Library."—On the moral, intellectual, and poetical merits of Euripides there was in ancient times, as there is in modern, a great diversity of opinion. Among his contemporaries, Socrates thought so highly of him that he made it a point to attend the theatre whenever a play of his was to be performed, and the philosopher delighted in his conversation. Aristophanes, on the other hand, pursued him with the keenest and most unrelenting ridicule, denouncing him as the corrupter of tragedy and the teacher of immoral doctrines, and contrasting him unfavorably in these respects with Æschylus and Sophocles. In modern times, A. W. Schlegel and the critics of his school have adopted the representations of Aristophanes as the basis of a serious but most disparaging judgment. The objections made to him have some foundation, but they have been

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pressed altogether too far. Aristotle, with his calm, impartial, and judicial criticism, while censuring his faulty management in some respects, yet pronounces him the most tragic of poets; and this, too, with the works of Sophocles and Æschylus before him. Milton's opinion nearly coincided with that of Aristotle. Euripides is censured as a woman-hater, and it is supposed that his distrust of the female sex grew out of his own domestic experience. He, like Socrates, is charged with a want of belief in the gods of his country. That might be an objection to some among his contemporaries, and perhaps it made the handling of mythological personages cold and unnatural on some occasions; but it ought to have little effect on modern judgment. In a literary point of view, the principal charges against him are that he lowered the tone of tragedy and weakened its style; that he degraded heroic characters, by representing them in beggary and rags, and by these coarse means attempting to work out pathetic effects; that he too often introduced his plays with long and tedious narrative or genealogical prologues; that his choruses frequently have little to do with the subject of the piece; and finally, that he delighted in the representation of criminal and unnatural passions. These statements, though having a germ of fact, are quite too absolutely made. His predecessors, Æschylus and Sophocles, had moulded the Attic dialect to forms of eloquence and grandeur, suitable to express the lofty sentiments of the great heroic characters they delighted to portray. The genius of Æschylus was naturally grave and elevated; his education and his experience of life had confirmed the original tendencies of his mind. He had shared fully in the great excitements and the sublime heroism of the Marathonian times. He had fought with distinguished bravery, both at Marathon and at Salamis. He was a Pythagorean, and had been initiated into the Eleusinian mysteries. His style of thought and expression was moulded by all these influences, and both had a solemn religious character. His ideas of the divine nature, of sin, of retribution, rise into the highest region of ethical and religious speculation; and his lines, whether in chorus or iambic, breathe a spirit in entire accordance with the loftiness of his conceptions. In his style Euripides is not lofty like Æschylus, nor elaborately elegant like Sophocles. In his plots he is not so simple as Æschylus, nor so carefully balanced as Sophocles. But in the study of human passions, in the analysis of the characters of men and women, in tracing actions to their hidden motives, through all the labyrinthine windings of pretence or self-deception, he is undoubtedly their superior. In his plays there is more of philosophy, in spite of the occasional sophistry that deforms them; there are more pithy maxims, sententious expressions of metaphysical and ethical truth, and discussions that really evolve important conclusions bearing upon the conduct of private or public life. If we judge by the busts and statues of Euripides that have come down to us in the collections of ancient art, he was a man of capacious brain, of grave if not melancholy countenance, and studious habits; and these impressions correspond to those made by a careful study of his works. In the freedom and flow of his style, beside its general elegance, we are struck on every page with apparently unstudied felicities of expression, which only Shakespeare, of modern dramatists, has equalled. His feeling for nature is deep, and the language in which that feeling is always expressed is wonderfully beautiful. Few poets have ever equalled him in the truthfulness of his characters. We censure him for having taken from life so much that was mean and unworthy of being adorned by his genius. In the character of Admetus, for example, it must be said that his miserable fear of death, and the contemptible means he resorted to to escape it, his shabby reproaches against his poor old father for refusing to die for him, make us regret his good fortune in possessing such a wife as Alcestis. If he was a woman-hater at times, he certainly knew how to do full justice to the nobleness, magnanimity, and disinterested affection of which woman is capable, as in that transcendently beautiful, but wholly natural and possible character. Where he seems to show an opposite tendency, by putting into the mouths of his characters sentiments disparaging to the purity and generosity of woman, these sentiments were doubtless drawn from what he had seen of the dark side of social life in Athens, and are by no means to be considered as the expression of a general misogynical judgment of the sex. Of the dramatic power exhibited in the character of Medea there can be but one opinion. This character is one of the most overwhelming power in dramatic literature, and it is carried out with a vigor of conception, splendor of language, and unfailing consistency that mark only the very highest productions of genius. The character of Phædra has been censured as a presentation of unnatural passion. At the first glance there seems to be some truth in this censure; but we are confident that the critic who studies it faithfully will come to a different conclusion. She has fallen a victim to an irresistible power; and under that supernatural influence—not supernatural according to Greek conceptions—is led to crime, ruin, and death. It is a delineation of terrible beauty; how terrible, and how beautiful, no modern can wholly understand who has not witnessed the wonderful representation of it by Rachel. She professed to play the Phèdre of Racine; but she rose from the words of Racine to the conception of Euripides. But we have not space to follow out this theme into further details. We will only add, that beside those we have already mentioned, Cicero and Quintilian of the ancients were among his warmest admirers; and the general estimation in which he was held is shown by the number of his pieces which have sur-

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vived, being 5 more than those of Æschylus and Sophocles together. The attacks of Aristophanes, and the graver condemnation of Schlegel, must be taken with large abatements; and a just judgment, while it admits that he had serious faults, must place Euripides high in the first class of tragedians.

EURIPUS, the ancient name of the narrow straits separating Bœotia from the island of Eubœa, or Negropont, in the Grecian archipelago. Both ancients and moderns speak of the extraordinary irregularity and violence of ebb and flow in these straits, changing, as Livy remarks, suddenly like the wind, and not merely 7 times every day, as was believed. A bridge was built over them connecting Chalcis of Eubœa with the mainland. The modern name is Egripo, or Stretto di Negroponte.

EUROCLYDON, the Greek name of a very tempestuous wind (Acts xxvii. 14), now known as a Levanter. It is of the nature of a whirlwind; and its danger results from its suddenness, violence, and the uncertainty of its course.

EUROPA, in mythology, a daughter of Agenor, king of Phœnicia, and sister of Cadmus and Phœnix; or, according to Homer, the daughter of Phœnix. Her beauty was said to be due in part to a recipe which had been stolen from Juno and given to her. She gained the love of Jupiter, who effected her abduction by playing with her in a meadow in the form of a gentle white bull, and when she had mounted upon his back, he started with her across the sea, and bore her attended by troops of nereids and tritons to the shores of Crete. There she became the mother of Minos, Rhadamanthus, and Sarpedon, and subsequently married Asterion, king of Crete.

EUROPE, one of the five principal divisions of the globe, the smallest except Australia, but the most important in the history of civilization. Geographically considered, it is merely a N. W. peninsula of the Asiatic continent, but from the earliest times it has been distinguished as a separate division of the globe. Its name in the time of Herodotus was applied only to that portion of the continent stretching from Thrace to the Peloponnesus, opposite Asia Minor. Different opinions obtain in regard to the etymology of the name. The belief that it originated in the myth of Europa was discarded by Herodotus. Since then there have been many other theories, none of which has remained uncontested. Ancient writers derive the name from Eurus (south wind), or from *ευρυς* and *αστα* (a Scythic word, quoted by the Greeks), the broad land, or from *ευρυς* and *ωψ*, the broad-looking (land). Modern scholars have sought for the origin of the name in the Semitic languages. Thus Bochart derives it from the Hebrew word *ereb* (west), while others hold that it is a corrupt form of the words *havra appa* (white-faced).—But little was known by the ancient Greeks of that portion of the continent lying N. of the great Alpine mountain system. In fact, for them the 3 large peninsulas stretching into the Mediterranean embraced nearly all Europe. In Strabo's time the German ocean and the Baltic were considered as the northern boundary of the continent. The existence of the Scandinavian peninsula and the Arctic ocean appears not to have been known to the Romans before the time of Pliny. Indeed, it was not till the political supremacy was wrested from the Latin by the German race that the geographical knowledge of Europe was perfected. Though much smaller in size than either Asia, Africa, or America, Europe has for many centuries exerted a greater influence upon the destiny of other portions of the globe than all the other divisions. McCulloch says: "It is to the world at large what Rome was to Italy or Athens to Greece—the favored land *unde humanitas, doctrina, religio, fruges, jura, leges ortæ atque in omnes terras distributæ putantur.*" But this assertion, as it stands, is obviously too general. For nearly 1,000 years subsequent to the downfall of the Roman empire, Europe slowly and laboriously struggled through barbarism at a time when the Mongolian race in eastern Asia had already attained a more perfect state of society and culture. It is only within the last 4 centuries that European civilization has matured so far as to be able to wield a controlling influence over distant regions and to stamp its seal upon their political state.—According to Ritter, Europe, with all islands belonging to it, has a superficies of 3,700,000 sq. m. and 20,780 m., of coast line, including 790 on the Caspian sea. The extreme points of the European continent are:

North: Cape North,	lat. 71° 10′ N.,	long. 26° 00′ 28″ E.
South: Cape Tarifa,	" 36° 00′ N.,	" 5° 35′ 37″ E.
West: Cape Roca,	" 38° 40′ N.,	" 9° 30′ 37″ E.
East: Sea of Kara,	" 69° 45′ N.,	" 65° 20′ 23″ E.

The length of Europe from Cape St. Vincent in the S. W. to the sea of Kara in the N. E. is 3,430 m.; the width from Cape North to Cape Matapan (the southernmost point of the Greek peninsula), 2,420 m. Europe is bounded N. by the Arctic ocean and the White sea, E. by the Ural mountains and river and the Caspian sea, S. by the ridge of the Caucasus mountains, the Black sea, and the Mediterranean, and W. by the Atlantic and the German ocean. The boundary line between Europe and Asia is somewhat undetermined, but that which ascends the Ural river from its mouth at the Caspian sea to the Ural mountain range, and follows the crest of that range to the sea of Kara, is usually adopted. The islands of Nova Zembla are set down by Humboldt as properly belonging to Asia, since by their vertical configuration they appear as a continuation of the Ural range. Erman, on the contrary, shows their connection with the Scandinavian mountain system, and this is also the view taken by most English geographers. The continent proper has the shape of a rectangular triangle, the hypothenuse of which extends from the bay of Biscay to the sea of Kara, while the right angle rests on the Caspian sea. The area of this main

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body of the continent is about 2,650,000 sq. m., that of the peninsular projections about 860,000, and that of the islands 195,500. Altogether Europe contains about $\frac{1}{14}$ part of the total area of the dry land of the globe. The proportion of the total area of the peninsular projections to the main body of the continent is as 1 to 3, a larger ratio than is found in any other division of the globe. A curved line drawn from a point in the Ural mountains, lat. 60° or 61° N., to the W. coast of Norway, lat. 69°, passing through Lake Onega and a little N. of the gulf of Bothnia, marks the extreme limits of cultivation. It cuts off an area of about 550,000 sq. m., or $\frac{1}{5}$ part of the entire surface. Europe is surrounded by water on 3 sides. On the N. the Arctic ocean, penetrating 450 m. into the continent, forms the White sea, which has an area of 35,000 sq. m. Its coast, situated for the greatest part within the temperate zone, has become a seat of culture notwithstanding its high latitude. On the W. the Atlantic ocean, narrowing between the British islands, the Scandinavian peninsula, and the continent, assumes the form of an inland sea (North sea, or German ocean, area 260,000 sq. m.), which is connected by the Skager Rack and Cattegat with the Baltic sea. The Baltic, comparatively a shallow sea, and less salt than the ocean, is almost entirely landlocked. By its numerous affluents, however, it has obtained a commercial and even a political importance in the history of the Germanic race, almost equal to that of the Black sea in early Greek history. Its area, exclusive of islands, is over 150,000 sq. m. The configuration of the southern coast of Europe is determined by the Mediterranean sea, a sheet of water 2,350 m. in length, covering an area of over 1,000,000 sq. m. By its position it forms the connecting link between Europe, Asia, and Africa, and for about 20 centuries the history of the Caucasian race was principally developed upon its coasts. The Black sea, connected with the Mediterranean by a narrow strait, is 700 m. long, 400 m. broad, and has a superficies of 180,000 sq. m. inclusive of the sea of Azof. The coast line along all these seas is 20,040 m., or one mile of coast line to 183 sq. m. of continent; 3,635 m. of coast line belong to the Arctic ocean, 8,480 to the Atlantic, and 7,925 to the Mediterranean. In consequence of the deep indentations of the sea, the western half of Europe contains no great inland country shut up from direct communication with the ocean. The distance from the bay of Biscay to the gulf of Lyons is only 257 m.; from the British channel to the same gulf, 469 m.; from the Pomeranian gulf to the gulf of Trieste, 584 m.; from the gulf of Dantzic to the Black sea, 782 m.; from the gulf of Finland to the sea of Azof, 1,012 m.; from the White sea to the sea of Azof, 1,255 m.; and from the sea of Kara to the Caspian sea, 1,656 m. Twelve large peninsulas are formed by indentations of the sea, 5 of them on the north, 3 on the west, and 4 on the south, viz.:

Names.	Area in sq. m.	Coast line in miles.
Kanin	8,500	414
Kola	38,900	690
Scandinavian peninsula	346,000	2,852
Jutland	12,800	502
North Holland	216	100
Normandy	864	46
Brittany	13,085	500
Iberian peninsula	229,000	1,992
Italian peninsula	63,300	1,610
Istria	760	115
Greece	142,600	2,760
Crimea	8,000	550
Total	859,025	12,121

Two of the 5 northern peninsulas stretch toward the Arctic ocean, and are consequently almost uninhabitable, viz., Kola and Kanin; the largest of the northern peninsulas (the Scandinavian) has a southern direction. Thus only a small portion of the coast configuration is lost to culture and commerce. The islands too, with the exception of Iceland, cluster so closely around the continent that, in considering the natural facilities which Europe offers to commercial intercourse, their coast line might be added to that of the continent. The principal of these islands are:

Names.	Area in sq. m.	Coast line.
Great Britain (main island)	84,340	2,852
Ireland	32,702	1,242
Iceland	38,850	1,472
Danish islands	4,963	736
Corsica	3,377	222
Sardinia	9,288	552
Sicily	12,960	529
Candia	4,104	568
Total	190,513	8,073

Beside these, the following may be mentioned: Nova Zembla and Vaigats in the Frozen ocean; the Loffoden on the coast of Norway; the Aland archipelago, Öland, Gothland, Oesel, in the Baltic; Jersey, Guernsey, Alderney, &c., in the English channel; Ushant and Belleisle on the W. coast of France; the Azores in the Atlantic; Majorca, Minorca, Elba, the Lipari islands, Malta, the Dalmatian archipelago, the Ionian islands, the Sporades and Cyclades, in the Mediterranean sea.—Considered as a whole, Europe has an average elevation of only 660 feet above the level of the sea. The same direction from S. W. to N. E. which prevails in the coast configuration is perceptible in the position of the mountains and their different strata. All the peninsulas, those stretching to the northward excepted, are mountainous, as are the islands, while the plains cover the largest portion of the main body of the continent. The proportion of the plains to the mountainous regions in all Europe is as 5 to 2; but in that portion of Europe which has been preëminently the seat of civilization and the theatre of history, the mountains prevail over the plains as 3 to 1. A diagonal line of mountain ranges, extending from S. E. to N. W. (Caucasus, Carpathians, and Hercynian mountains), forms the dividing line between the mountainous and the

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level portions of Europe. The latter, extending from the shores of the German ocean to the Ural, appear as a western continuation of the steppes of Siberia and Turan, intersected by the insular Ural range. While on the shores of the German ocean its width is only 93 m., this being the point where the mountain systems approach the ocean, in the extreme east it is 1,400 m. wide. Its entire length is near 2,300 m., its area 2,100,000 sq. m. Proceeding from the heaths of West Brabant in an easterly direction, even beyond the Ural passes to the steppes on the western slope of the Altai mountains, 80 degrees of longitude, no elevation of over 1,200 or 1,300 feet above the level of the sea is met with. The western or European portion of this plain appears to have formed, after the commencement of the tertiary period of geology, the bed of the sea. It includes the whole basin of the Baltic and White seas. A part of it is traversed by rivers flowing northward from the Alps, the Bohemian and Sudetic mountains. To the eastward the watershed between the Baltic and the Black and Caspian seas is only a few hundred feet in elevation; commencing at a spur of the Carpathians near the source of the Dniester, it runs through the Russian governments of Volhynia, Grodno, Minsk, Mohilev, Smolensk, Pskov, Tver, Novgorod, and Vologda, to the Ural range. Though interspersed with marshes, bogs, and heaths, this immense plain is susceptible of high culture, but nowhere is the soil so fertile as to produce crops without laborious diligence. Thus it became naturally the seat of a civilization based in part upon the sterling characteristics of the energetic Teutonic race. Connected with this large plain are two lesser ones, in France (94,000 sq. m.) and in Hungary (38,000 sq. m.).—The mountain system of southern and western Europe is grouped around the central mass of the Alps, which forms the summit and the principal watershed of the continent. The Alps, covering an area of 95,000 sq. m., slope down on 4 sides toward France, Germany, Hungary, and Italy. Although towering up in numerous steep and rocky summits, they constitute one of the most accessible mountain systems of the globe, and form by their extensive valleys and practicable passes rather a connecting link than a dividing line between the surrounding countries. The highest elevation of this system and of all Europe is Mont Blanc (15,732 feet, according to Bruguière). The lowest limit of perpetual snow in the Alps is 8,760 feet in the latitude of 45° N. Connected with the Alpine system are the mountain systems of the 3 southern peninsulas, viz., the Hesperic or Pyrenean system, the Apennines, and the Balkan, and also the group of the Carpathian and Sudetic mountains. The Pyrénées stretch from E. to W. for 240 m., but, including the Cantabrian mountains, their length is 500 m. Their S. side, toward Spain, is rugged and precipitous, while on the N. they descend gradually by a series of parallel ridges into France. They send 4 principal chains through the Iberian peninsula, the whole system covering a superficial area of 210,000 sq. m. Their culminating point is the Cerro de Mulhacen in the Sierra Nevada (11,660 feet). The Apennines, stretching from the Alps through the entire length of Italy to the strait of Messina (840 m.), cover an area of 60,000 sq. m. Their highest summit is the Monte Corno (9,542 feet). The Carpathian and Sudetic mountains, with the Erzgebirge and the Böhmerwald, form one chain extending 1,200 m. in length, from the Danube in Hungary to the same river in Bavaria. Their highest elevations, from 5,000 to 8,000 feet, are in Transylvania and Hungary, where they surpass the lower limit of perpetual snow. The Balkan, a direct continuation of the Dinaric Alps, sweeps in an irregular curve from the Adriatic to the Black sea. It is the Mount Hæmus of the ancients. Its general elevation is about 4,000 feet, though the culminating point (Tchardagh) reaches the height of 9,700 feet. Thence one range, the ancient Pindus, diverges to the S., dividing Albania from Roumelia, and connecting with the mountains of Greece, the loftiest summits of which attain an elevation of 8,000 feet. Near the eastern end of the principal range the Little Balkan branches off in a S. E. direction, and, running parallel to the shore of the Black sea, terminates near the Bosporus. Between the Alpine system proper, the Pyrénées, and the Atlantic (in France), there are 3 separate mountain ranges, viz., the Cévennes and mountains of Auvergne, the Jura, and the Vosges. The Cévennes divide the low country on the Mediterranean and the basin of the Rhone from the plains extending W. to the Atlantic; their general elevation is from 3,000 to 5,000 feet, though some peaks rise to a height of about 6,000 (Plomb de Cantal, 6,093; Mount Mezin, 5,918 feet). The Jura, of nearly the same elevation, extends along the frontier of France and Switzerland. Further to the N. the Vosges divide the basin of the Rhine from that of the Moselle, their summits ranging from 1,400 to 4,000 feet, and the loftiest only 4,693. There are several plains, independent and differing in their principal features from the great northern plain, enclosed by the Alpine system, to wit: the basin of the Po (15,000 sq. m.), the basins of the Rhone and of the upper Rhine (4,250 and 3,500 sq. m. respectively), and the Moravian plain (1,000 sq. m.). Beside the above mentioned ranges, all more or less immediately connected with the central system of the Alps, Europe contains, in its islands and peninsulas, 5 distinct mountain systems. They are the Sardo-Corsican, the Tauric, the British-Hibernian, the Scandinavian, and the Sarmatian. The Sardo-Corsican, as its designation implies, is the range of mountains stretching from N. to S. through the islands of Corsica and Sardinia; its highest summit, Monte Rotondo in Corsica, has an elevation of 9,054 feet. The Tauric system is con-

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fined to the southern portion of the Crimea, its greatest elevation being 5,052 feet. The British-Hibernian system in Great Britain and Ireland is comparatively insignificant, rising in its highest peaks but little over 4,000 feet (Snowdon in Caernarvonshire, 3,570 feet; Cader Idris in Wales, 3,550; Ben Macdhu in Scotland, 4,390; Ben Nevis, 4,370; Cairntoul, 4,245; Helvellyn and Seafell in Cumberland, 3,055 and 3,166 respectively; Carran Tual in Ireland, 3,410). The Scandinavian Alps or Dovrefield extend 1,000 m. from N. to S. through the entire length of the Scandinavian peninsula, at a general elevation of from 3,000 to 6,000 feet. Their highest summits are the Sneehætten, 8,120 feet, and the Skagtöls Tind, 8,400. In the N. portion the lower limit of perpetual snow is at 3,500 feet above the level of the sea. The Sarmatian system consists only of a few scattered hill chains in Russia, Poland, and the N. E. part of Prussia; its greatest elevation, in the plateau of Valdai, is only 1,118 feet. The Ural range, which forms the N. E. boundary line of Europe, extends from N. to S. through 20 degrees of latitude, with a breadth of 40 m. and a general elevation of less than 2,000 feet, only a few summits rising to a height of 2,500 feet. Toward the S. it diverges into smaller ridges that extend to the Caspian sea, the sea of Aral, and the steppes of the Kirghiz. A volcanic belt extends through the southernmost portion of Europe from central Asia and Asia Minor through the archipelago, Greece, Naples, Sicily, Spain, and Portugal, to the Azores. Along this line destructive earthquakes are of frequent occurrence. Beside many extinct craters, there are two active volcanoes, Etna in Sicily and Vesuvius near Naples. In the north, Iceland constitutes a distinct volcanic region. Its principal volcano is Mount Hecla, some eruptions of which have lasted for 6 years. The S. W. portion of the island contains the famous geysers, or intermittent springs of steam and boiling water. There are two other volcanoes, one on the island of Jan Mayen, between Iceland and Spitzbergen, the other (mountain of Zarytcheff) on the northern island of Nova Zembla. Altogether Europe contains 37 summits of over 11,000 feet elevation above the level of the sea, 48 of more than 10,000 and less than 11,000 feet, 109 over 9,000 and under 10,000, 92 between 8,000 and 9,000, and 160 between 7,000 and 8,000. Of these, 320 belong to the Alpine system.—In accordance with the prominent features of the vertical elevation, 4 natural divisions may be pointed out in Europe: 1. Lower Europe, comprising Russia, Poland, Galicia, and the eastern provinces of Prussia. A monotonous plain, assuming the character of steppes in the S. and of swamps in the N., inhabited by the Slavic race under absolute monarchical rule, it forms the connecting link between Europe and Asia. 2. Upper Europe (Switzerland, Austria, Germany, Belgium, Holland, France) comprises the most diversified geographical formation, and is hence the seat of a varied social and political development, which in Germany assumes almost the character of political dismemberment. Its eastern portion, the basin of the Danube, shows some features of Asiatic geography, such as the pusztas or prairies of Hungary. 3. Southern Europe consists of the three southern peninsulas (Spain and Portugal, Italy, Greece). Combining many of the advantages of the temperate and sub-tropical regions, it became the earliest recipient of Asiatic and African culture, to the influence of which a portion of it remained subject even at a time when Christian civilization had been vigorously developed by the Teutonic race in central Europe. 4. Northern Europe (the Scandinavian peninsula, Denmark, and Great Britain) is less favored in climate and natural resources, and hence most adapted to the development of energy, self-reliance, and daring courage.—The river systems of Europe are less extensive than those of either Asia or America. The principal watershed of the continent, running from S. W. to N. E., from the strait of Gibraltar to the sea of Kara, divides the continent into a S. E. and a N. W. slope, the former containing 57.5, the latter 42.5 per cent. of the total area (2,000,000 and 1,500,000 sq. m. respectively). On the S. E. slope the basin of the Caspian sea comprises about 500,000 sq. m.; that of the Black sea and the sea of Azof about 930,000 sq. m.; and the basin of the Mediterranean sea, 570,000, sq. m. On the N. W. slope the Atlantic basin and the basin of the Baltic comprise 460,000 sq. m. each, the basin of the German ocean 400,000, and that of the Arctic ocean 180,000. The following are the principal rivers flowing into the different seas: 1, Caspian sea: Ural and Volga; 2, sea of Azof: Don; 3, Black sea: Danube, Dniester, Dnieper, 4, Mediterranean: Maritza, Kara Soo, Vardar, Salembria, Aspropotamo, Arta (in Turkey and Greece), Drin, Narenta, Isonzo, Tagliamento, Piave, Brenta, Bacchiglione, Adige, Po, Rubico, Metauro, Ofanto, Sele, Volturno, Garigliano, Tiber, Ombrone, Arno, Var (Dalmatia and Italy), Rhone, Hérault, Aude, Tet, Tech, Ter, Llobregat, Ebro, Guadalaviar, Xucar, Segura (France and Spain); 5, Atlantic: Minho, Ducro, Vouga, Mondego, Tagus, Caldao, Guadiana, Tinto, Guadalquivir, Guadalete; 6, bay of Biscay: Bidassoa, Adour, Garonne, Charente, Sèvre-Niortaise, Loire; 7, British channel: Orne, Seine, Somme; 8, German ocean: Scheldt, Rhine, Vecht, Ems, Weser, Elbe, Eider; 9, Cattegat: Götha Elf, Glommen; 10, Baltic sea: Ulea, Neva, Narova, Pernau, Düna, Windau, Niemen, Pregel, Passarge, Vistula, Leba, Lupon, Stolpe, Vipper, Persante, Rega, Oder, Rekenetz, Varnow, Trave, Motala Elf, Dal Elf, Angermann Elf, Umea Elf, Pitea Elf, Lulea Elf, and Tornea Elf; 11, Arctic ocean: Tana Elf, Onega, Dwina, Mezene, Petchora. Beside these, there are the rivers of the British islands, the chief of which are the Thames, Severn, Medway, Trent, Ouse, Tyne, Tees, Wear, Mersey, Dee, Avon, Eden, and Derwent, in England; the Tweed, Clyde, Forth, Tay, Dee, Don, Spey,

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Nith, and Annan, in Scotland; the Shannon, Brandon, Lee, Blackwater, Suir, Barron, Slaney, Liffey, Boyne, Baun, Foyle, in Ireland. The most important of these rivers are: the Volga, Don, Vistula, Danube, Oder, Elbe, Weser, Rhine, Rhone, Loire, Tagus, Thames, Severn, Mersey, Forth, Clyde, and Shannon. The largest river of Europe is the Volga, with a course of over 2,000 m. and a basin of over 500,000 sq. m.; next comes the Dannbe (length of course 1,770 m., basin 308,000 sq. m.). Artificial water courses connect the Caspian sea, the Baltic, and the Arctic ocean, by the Volga, Neva, and Dwina rivers; the Black sea and the German ocean by the Danube and Rhine; the Mediterranean and the Atlantic ocean, British channel and German ocean, by numerous canals between the Rhone, Garonne, Loire, Seine, Scheldt, and Rhine. The middle course of most of the large rivers is well adapted to navigation by steam and other vessels, but their usefulness for the purposes of commerce is restricted by obstructions at their mouths. Such is especially the case with the Volga, Don, Danube, and Rhine.—The lakes of Europe are small, and scarcely any of them important to commerce. The following are among the largest: Ladoga (6,330 sq. m.), Onega (3,280), Saima (1,600), and Enara (685), in Russia; Wener (2,135), Wetter (840), and Maelarn (760), in Sweden; lake of Geneva (240) and lake of Constance (200), in Switzerland; Garda (180) and Lago Maggiore (150), in Italy; and Lake Balaton (138), in Hungary. Four-fifths of the lakes in Europe are situated in the region around the Baltic sea.—The whole of Europe, with the exception of a small northernmost portion of the Scandinavian peninsula and Russia, being situate within the temperate zone, enjoys an equal and temperate climate, favorable to a healthy muscular development. The disadvantages arising from the proximity of the Arctic ocean and the climatic influences of northern Asia are more than overborne by many advantages which no other division of the globe enjoys in an equal degree. The prevailing winds are western, and hence before reaching Europe have been in contact with an expanse of water, the surface of which has, even in January and in lat. 45–50° N., rarely a lower temperature than 44°, 48°, or 50° F. In the second place, Europe is influenced by a broad tropical zone including Africa and Arabia, whose dry soil serves to warm the air carried to Europe by southern winds. On the other hand, the influence of the Arctic ocean upon the climate of the continent is neutralized by the Gulf stream. The combination of all these advantages explains the fact that the mean temperature of Europe is higher than that of any other division of the globe in corresponding latitudes, the isothermal lines of Asia and America bending in Europe to the northward by some 10 degrees of latitude. Thus in lat. 36° N. the mean temperature of the year is 66° F., and in lat. 71° N. (Cape North) it is 32° F., not lower than in lat. 55° 56′ N. on the E. coast of Asia and America. Owing to the causes before mentioned, the mean temperature of Europe is higher and the extremes are less in the same latitudes in the western than in the eastern part. The isothermal line of 50° F. (mean annual temperature) runs from London to Cracow and Odessa, that is to say, from lat. 51° 30′ to 46° 22′ N., thus declining nearly 5 degrees of latitnde to the S. in a course of 31° 5′ of longitude. The isothermal line of 59° F. runs from Bayonne, touching Ancona and Durazzo, to Larissa, or from lat. 43° 29′ to 40° 16′ N. in 24° 5′ of longitude. A mean annual temperature of 68° is only met with on the southern coast of Portugal. But while the mean temperatnre diminishes advancing eastward, the extremes of the heat of summer and the cold of winter increase. Thus London has the same mean temperature as Vienna, which lies more than 3½ degrees further S., but it has the summer of St. Petersburg and the winter of Milan. The transitions from winter to summer and from summer to winter are less abrupt in the largest portion of Europe than they are in America. Almost everywhere the seasons succeed each other with great regularity. The extreme north only, where the winter lasts for 8 months, and the extreme south, form exceptions. The fall of rain is more eqnally distributed to the N. of the Alpine system than to the S. of it. It has been calculated that the entire quantity of rain falling in the N. part of Europe is less by ⅓ than in the S., bnt the snow of the N. covers the deficiency of rain. The western winds, being laden with the moisture which they have received in passing the Atlantic, generally bring rain, while the eastern winds are dry and chilly. From the same cause the average quantity of rain is largest in Great Britain, and decreases in advancing to the E. and S. E. Thunderstorms occur in the N. part of Europe almost exclusively during the summer, in the S. part at all seasons of the year.—The vegetation of Europe, dependent upon and corresponding to its climate, has not the extremes of luxuriance or sterility belonging to other great continents. Culture has diversified it, and has domesticated many plants, natives of other countries. Thus the vine, olive, and mulberry have been introduced from Syria, the cotton plant from India, maize from America, the walnut and peach from Persia, the apricot from Armenia, the sugar cane and orange from China; while many of the indigenous plants, especially vegetables (as lettuce, cabbage, turnips), have been improved by cultnre to such a degree that their relationship with their wild types is scarcely evident. Europe may be divided into 3 vegetable zones, viz.: 1. The sub-arctic zone, characterized by the prevalence of the pine and birch and of cryptogamous plants. Of grain it produces only barley, and no fruit whatever. This zone comprises Iceland, the Färöe islands, the Scandinavian peninsula N. of lat. 64°, and Russia to the N. of lat 62°. 2. The central zone, subdivided into the zone of the beech and oak, and that of the

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chestnut and vine. The former includes Great Britain and Ireland, the Scandinavian peninsula S. of lat. 64° N., and the German and Sarmatian plain between lat. 62° and 48°. The latter comprises the valleys and plains between the mountain ranges of central Europe and the Sarmatian plain. In the former, rye and wheat are the principal grains; in the latter, wheat and maize. 3. The southern zone, or the region of perpetual verdure, and of the olive, comprising the 3 southern peninsulas and the southern coast country of France, distinguished by a great variety and luxuriance of sub-tropical vegetation. The sugar cane, cotton plant, banana, orange, citron, fig, pomegranate, and date grow in the southernmost belt of this region. The zones in which these fruits and plants grow follow the lines of equal summer heat, and hence run from S. W. to N. E., since the extremes of summer heat and winter cold increase advancing eastward, though the mean annual temperature decreases. Thus the cotton plant is cultivated on a small scale in the southernmost portion of Spain, from lat. 36° to 37°, to a greater extent in Sicily, and also in the S. E. angle of Italy, in Greece as high as lat. 41½°, and at Astrakhan in lat. 46°. The olive, which does not succeed on the W. coast of France in lat. 43°, grows as far as lat. 44–45° in the S. E. provinces of France and in Italy. The fig and pomegranate, which accompany the olive in the west, are found in the Crimea as far N. as lat. 46°. The climate proper for the culture of maize terminates on the W. coast of France at lat. 45° 30′, on the Rhine at 49°, on the Elbe at 50–51°. Rice has nearly the same geographical range. The culture of the vine extends as far N. as lat. 47° 30′ on the Atlantic coast, 50° 30′ on the banks of the Rhine, 52° on the Oder river. In Russia it grows as far N. as lat. 52°, but it is not cultivated beyond 50°. Altogether the region adapted to the cultivation of the vine comprises about ⅔ of Europe, that adapted to the culture of wheat ¼. The N. limit of the latter is lat. 57–58° N., though it is raised in a few favored spots in Finland as far N. as lat. 60° and 61°. The hardier kinds of grain, rye, barley, and oats, are cultivated on the W. side of Norway as far as lat. 69° 55′ N., but on the E. side of the Scandinavian mountains they scarcely ripen at 67–68°, and still further E. in Russia they cannot be cultivated beyond lat. 60–62°. Peaches and apricots succeed in Russia as far N. as lat. 50°, melons at lat. 52°; and plums and cherries, growing wild as far as lat. 55°, are carried beyond that limit by cultivation. Tobacco is extensively cultivated over the greater part of Europe, from Sicily to Sweden, as are flax and hemp, though they thrive best between lat. 45° and 60°.—Europe contains the various minerals, though in unequal proportions. It is abundantly supplied with iron, copper, lead, coal, and salt, but produces comparatively small quantities of gold and silver. Gold, though widely diffused, is only found in a few places (Carpathians, Ural mountains, and Scandinavian Alps) in sufficient quantities to repay the expense of working it. Silver is mined in the Hartz, the Carpathians, Ural mountains, Scandinavian Alps, and Sardinia. The richest iron mines are in Sweden, which produces the best quality, in Great Britain, which has the largest quantity, in Styria, Carinthia, Bavaria, the Pyrénées, the Carpathians, and the Hartz mountains. Copper is less abundant than iron; the richest mines of this metal are to be found in Hungary, the Saxon and Bohemian mountains, in England, the Ural mountains, and the Scandinavian Alps. Lead is wrought in most of the large mountain ranges, tin only in a few places (Cornwall and the Hartz). Mercury is likewise confined to a few spots, as the mines of Idria in Carniola, Deux Ponts in the Palatinate, and the Spanish province of La Mancha. The richest coal fields exist in the N. and W. parts of England, on both sides of the middle region of Scotland, in Ireland, Belgium, France (¼ of the entire area of which country is stated to consist of coal beds), Germany, Catalonia in Spain, and Sardinia. Salt is either obtained by the evaporation of brine from salt springs, or from depositories of mineral salt, of which the most extensive are found within the Austrian empire at Wieliczka and Saltzburg. Salt springs are numerous along the sides of all mountains belonging to the primitive formation. Large quantities of salt are also collected from the salt lakes of the Crimea. Zinc is wrought in England and Germany, and cobalt in Saxony. Beside these metals, antimony, bismuth, manganese, sulphur, alum, &c., are obtained in larger or smaller quantities in the different mountain chains.—The animal kingdom of Europe is far less varied than the flora. The diversities of the 3 zoological regions are inconsiderable, and the only real contrast is between the arctic animals of the extreme north, as the reindeer, white bear, &c., and the beasts of prey of the extreme south, the lynx, wild cat, &c. The original features of the fauna of Europe have been greatly modified by culture. Several species of wild animals have disappeared entirely in many countries, as the wolf and bear in Great Britain and in some parts of the continent, while others are becoming scarcer from year to year. Thus the jackal is now only found in Dalmatia, the urus and the elk in some Polish provinces of Russia, the porcupine in the extreme south, the monkey near Gibraltar, the chamois and ibex in the Alpine mountains. But if Europe is poor in wild beasts, it is rich in domestic animals. In the northernmost region, as far S. as lat. 65° N. in Lapland, and lat. 63° in Russia, the reindeer abounds; central Europe has immense numbers of horses, horned cattle, sheep, goats, and hogs; and southern Europe possesses, beside these, mules, camels (the Arabian in Tuscany, the Bactrian in S. Russia), and buffaloes (in Spain). Altogether Europe has 150 species of mammalia, 58 of which are peculiar to that continent. Of small birds Europe has 400 species, but many of them are only birds of passage. Among those

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kinds of birds peculiar to certain regions are the flamingo, spoonbill, pelican, and vulture in the S., gray eagle in the N. eider duck (N. of lat. 55°), swan, and red grouse in the N. and N. E., bee-eater in the S. E., white owl in the extreme N., &c. Various species of turtles excepted, Europe has no large amphibia. Fish are more abundant on the N. than on the S. coast; herring and codfish are found only in the N., sturgeon in the Russian rivers and seas, anchovies and pilchards on the S. W. coast, tunny fish in the Mediterranean. Of insects, several kinds of tarantula and scorpions are peculiar to Europe. The silkworm is raised principally in the S. countries, the honey bee everywhere on the continent. The annelides of Europe include the medicinal leech (in Sweden, Germany, Hungary, and Poland). Europe is abundantly supplied with edible mollusks, but they are found in greater abundance and better quality in the Mediterranean sea than on the N. coast. Radiated animals, zoophytes, &c., also abound on the S. coasts, where some of them (the actinias) are used as food, and where the coral fisheries employ many persons. Generally the S. part of Europe possesses a greater variety of animals and species than the N., while the latter has them in greater numbers.—The inhabitants of Europe are a mixture of many different tribes, most of them belonging to the great Indo-Germanic stock of the Caucasian race. Of the aborigines of Europe nothing is known with any degree of certainty, although scientific researches have led to discoveries upon which the most singular theories have been based. Thus it has been attempted to prove that at one time, long before the dawn of recorded or even traditionary history, a negro race inhabited central Europe; and that after their extinction there was a period during which two races, distinguished by their cranial formation as long-heads and short-heads, inhabited the W. islands and the central part of the continent. Disregarding these theories, we find that in the W. of Europe the Iberians appear as the aboriginal inhabitants, of whom the Basques are believed to be the only extant remains. At a very early epoch these aborigines were intruded upon by people of the Gaelic or Celtic stock, who acquired possession of all France, Britain, Ireland, Spain, and the N. of Italy (Gallia Cisalpina). Afterward another kindred people, speaking a different language (the Cimbric, Cymric, or Cambrian race), conquered the N. of France, the S. and E. of Britain, and the N. W. shores of Germany. These 3 races, Iberians (Basques), Celts, and Cymri, are found in possession of the W. and S. W. of Europe at the dawn of history. In the E. and N. W. the Ugrian (Mongolian) races (perhaps the Scythians of the ancients), of whom the Lapps, Finns, Samoyeds, and the Magyars are the present remains, seem to have been the original inhabitants. At an early period the Sarmatians (Slavi) settled in the countries N. of the Black sea, and pressing N. E., gradually dispossessed the Ugrians of their country. Between the Ugrian and Sarmatian races of the E. and the Celts and Cymri of the W., the Germanic races are found at the earliest period of traditionary history pressing N. to conquer Scandinavia and S. against France and Italy. The S. E. of Europe was probably settled from Asia and Africa; history finds in Greece and Italy two races who afterward became known as the Hellenic and Roman. The former was the first to develop in Europe a high state of culture, which, having been received by the conquering Roman race, was carried over all the countries around the Mediterranean. Having exhausted their power, the Roman conquerors were in their turn overthrown by the hardy, vigorous, and barbarous northern nations, who, after having embraced Christianity, in the course of many centuries developed a new and different civilization upon the basis of the recognition of a common higher destiny of mankind. The Heruli, Ostrogoths, Longobards, and other Teutonic tribes, penetrated into and settled in Italy; Suevians, Visigoths, and Vandals in Spain; Franks and Burgundians in Gaul (France); Angles, Saxons, Jutes, and Frisians in Britain. In Italy, Spain, and France, the conquerors were mostly assimilated to the nations whom they had found there, and by their admixture with them the present so-called Latin or Romanic race was produced. In Britain, the invaders drove the original inhabitants into Wales, Cornwall, and Cumberland, but were in their turn invaded by Normans and French in the 11th century, when the admixture of all these different elements, Celtic, Anglo-Saxon, and Norman, gradually produced the present English race. In Spain, the Goths and Vandals were overrun by Arabs in the 8th century, and did not recover possession of the country for 7 centuries. In the S. E. the Hellenic race became during the middle ages largely mixed with the Slavic, while around the lower course of the Danube an intermixture of the ancient Dacians with a Roman colony produced the present Roumain or Wallachian race. Toward the end of the 9th century a Ugrian race settled in the ancient Pannonia, where they remain to the present day under the names of Magyars in Hungary and Szeklers in Transylvania. Of the Tartars who under Genghis Khan entered Europe in the 13th century, and kept possession of a large portion of Russia till the end of the 15th century, some descendants still remain in the S. of that empire. The Osmanli, another branch of the Mongolian race, invaded Europe in the 14th century, and have ever since kept possession of the S. E. corner of the continent. By mingling freely with W. nations they have lost many characteristic features of the Mongolian stock.—The population of Europe in 1850 was calculated at 266,000,000, or 74 to the sq. m., by Reden; at 267,000,000 by Bescherelle; at 296,000,000, or 83 to the sq. m., by Berghaus; while the "Encyclopædia Britannica" in 1855 sets it down at 258,678,856 only. Dieterici (1859) estimates it at 272,000,000.

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Its distribution between the E. and W. portions is very unequal, the average population on a square mile being nearly 100 in the W. and only 30 in the E. With the exception of the 4 free cities in Germany, the canton of Geneva, and Malta, the greatest density of population prevails in Belgium (409); next come the kingdom of Saxony (353), England (332), the grand duchy of Hesse (266), the duchy of Saxe-Altenburg (263), the Netherlands (260), Great Britain (239), northern and central Germany (about 200), Ireland (203), Italy (199), the German provinces of Austria (180), France (176), Bavaria (154), Russia (30), Sweden (20), Norway (11), Iceland (0.15). The average natural increase per annum of the population varies from 0.5 to 1.2 per cent. It is 1.43 per cent. in Great Britain, 1.16 in Prussia, 0.6 in all Germany, 0.59 in France. Ireland is the only country in which there has been, of late, a decrease of population. There are in Europe altogether 39 cities with more than 100,000 inhabitants to each. Of the population of Europe more than $\frac{19}{24}$ belong to the Caucasian race, of which all, with the exception of 3,000,000 Jews and Arabs (Semitic stock), are of the Indo-European stock. The Indo-European nations all profess Christianity, and present in their historical progress so many features distinct from the Asiatic and African nations, that they may properly be termed the people of Europe. They are divided into 3 great branches, viz.: 1, the Romanic or Latin race (31 per cent. of the total population), inhabiting the monntainous S. W. countries on the Mediterranean and Atlantic ocean; they are sensitive, excitable, passionate, and vindictive, temperate in eating and drinking, imaginative and inventive; mostly Roman Catholics; 2, the Germans (28.2 per cent.), thronging the elevated plains and valleys of central Europe and the shores of the Baltic and Northern ocean; thoughtful, clear-minded, honest, industrious, persevering; mostly Protestants; 3, the Slavi (27.8 per cent.), thinly distributed on the plains of the east; less developed in intellectual qualities, of a temperament alternating between oriental languor and passionate excitement; Roman and Greek Catholics, representatives of the Asiatic principle in Europe. A connecting link between the Romanic and Teutonic races is found in the Belgians; between the Romanic and Slavic, in the Greeks and Wallachians; between the Slavic and Teutonic, in the East Prussians, Pomeranians, Lusatians, and Austrian Wends. Of the Mongolian race there are two principal branches, each of them numerously subdivided, viz., the Finns and the Turks. As a nation they stand on a still lower plane of intellectual and industrial development than the Slavic races; they are mostly Mohammedans or pagans. The Magyars, originally belonging to the same race, have been influenced so much by the Indo-European nations, that they scarcely preserve any of the features peculiar to the Mongolian family. The following table exhibits the different races which at this day inhabit Europe:

I. Caucasian Race.		
1. Indo-European nations.		
a. Romanic or Latin races.		
Greek (Pelasgian) branch	2,800,000	
Italians	25,000,000	
Spaniards and Portuguese	19,000,000	
French	38,500,000	
Rhætians (Switzerland)	200,000	
Wallachians	5,000,000	
		90,000,000
b. Celts.		
In Scotland and Ireland	6,000,000	
In Wales and Brittany	3,000,000	
		9,000,000
c. Germans.		
Germans proper	51,000,000	
Scandinavians:		
Danes	1,600,000	
Norwegians	1,400,000	
Swedes	3,500,000	
	6,500,000	
Anglo-Saxons	20,000,000	
		77,500,000
d. Slavi.		
Western Slavi:		
Wends	200,000	
Poles	10,000,000	
Cechs	4,800,000	
	15,000,000	
Eastern Slavi:		
Russians and Rutheniana	50,000,000	
Southern Slavi:		
Servians, Slovacks, Croatians, &c.	7,500,000	
Bulgarians	4,000,000	
	11,500,000	
		76,500,000
e. Letts and Lithuanians		2,000,000
f. Basques and Euscaldunacs (ancient Iberians)		700,000
g. Albanians and Illyrians		2,000,000
h. Armenians (in Transylvania and straggling settlements on the Don)		80,000
i. Gypsies		270,000
		254,000,000
2. Semitic nations.		
a. Jews	3,000,000	
b. Maltese (Arabs mingled with Latins and Germans)	100,000	
		3,100,000
		261,100,000
II. Mongolian Race.		
1. Finns.		
a. Baltic (Germanized) Finns (Livonians, Esthonians, Ingres, Suonians, Carelians, Lappe)...	2,000,000	
b. Volgian Finns (Tchouvashs, Mordvinians, Tcheremisses, Teptiares)	400,000	
c. Permian Finns, on the Kama, Dwina, and Petchora (Votjaks, Sirjänes, Permians)	150,000	
d. Ugrian Finns (in Sweden and Norway)	50,000	
	2,600,000	
2. Magyars (in Hungary and Transylvania)	5,500,000	
3. Szeklers (in Transylvania)	200,000	
4. Voguliana (Russ. province of Perm)	60,000	
5. Samoyeds (in N. E. Russia)	40,000	
6. Turks.		
a. Osmanli	2,400,000	
b. Nogai, Bassians, Bashkirs, Meshtsheretz, Tartars, over	100,000	
	2,500,000	
		10,900,000
Total		272,000,000

—Most of the languages spoken by the different nations of Europe show some traces of a common though very remote origin. Modern linguistic science has proved their relationship with the Sanscrit, and its early correlative or derivative tongues, and groups them under the head

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of Indo-European, or Indo-Germanic languages. The following table exhibits all the European languages in their relations to each other:

I. Indo-Germanic languages.
1. Pelasgic group: *a*, ancient and modern Greek; *b*, Latin, from which, either by degeneration or by admixture with the Celtic, Germanic, and Slavic languages, the following have descended: Spanish, Portuguese, French, Italian, Rhætian or Grison, and Wallachian; *c*, Albanian.
2. Germanic group: *a*, German (high and low Dutch) and English; *b*, Scandinavian (Icelandic, Swedish, Norwegian, and Danish).
3. Slavic group, divided into many dialects, as Russian, Illyrian, Servian, Bulgarian, Slovack, Bohemian, Sorbian (Wend), Polish.
4. Lettish group, divided into the Lett language proper, Lithuanian, and Samogitic.
5. Celtic group, formerly dominant in western and central Europe, but now only spoken in Ireland, Wales, and Brittany.
6. Aryan group, represented only by the language of the Gypsies.

II. Finnish-Tartaric languages.
1. Finnish: *a*, Karelian; *b*, Esthonian, *c*, Livonian; *d*, Lappic.
2. Hungarian.
3. Turkish.

III. Basque, not related to any other European language, is spoken only in the north of Spain.

—With the exception of China proper, the physical culture of no other part of the world is so much developed as that of Europe. Of the total area 20 or 23 per cent. is non-productive, being either lakes, rivers, swamps, rocks, or occupied by buildings, or, like the extreme northern portion, unfit for human habitation; 36 per cent. is devoted to agriculture or cattle-raising; and over 40 per cent. is in forests, of which Russia alone has over 1,000,000 sq. m. The best cultivated countries are Great Britain, Germany, and France. The introduction of scientific methods of agriculture into these countries has tended steadily to increase the productive capacities of the soil. This is especially the case in Great Britain, where the average crop of grain to the acre is considerably larger than in the United States. The number of domestic animals in Europe is stated by Reden as follows: Horses 27,000,000, valued at $775,470,000; horned cattle 80,000,000, value $864,720,000; sheep 191,000,000, value $687,600,000; asses 1,800,000, value $12,600,000; goats 16,800,000, value $36,450,000; hogs 37,500,000, value $108,240,000; mules 800,000, value $17,160,000; aggregate value of domestic animals $2,502,210,000. The average yearly mineral production is, according to the same authority, of gold, $26,000,000; of silver, $3,024,000; of iron, 35,700,000 cwt., or $128,376,000; of copper, 500,000 cwt., or $11,520,000; of lead, 1,330,000 cwt., or $4,795,200; of tin, 94,000 cwt., or $2,635,200; of quicksilver, 23,400 cwt., or $1,677,600; of coal, 536,500,000 cwt., or $96,500,000; of brown coal, 10,000,000 cwt., or $500,000; of salt, 53,300,000 cwt., or $48,240,000; of brimstone, 22,500 cwt., or $118,400; total, $323,396,400. The industrial production is largest in Great Britain, Belgium, France, and Germany. The facilities of commerce have been increased extraordinarily within the last quarter of a century by turnpikes, canals railroads, steamboats, ocean steamships, &c. The total annual value of European commerce was estimated by Reden in 1853 at $2,750,000,000 ($1,400,000,000 imports, and $1,350,000,000 exports). Of this amount the commerce of Great Britain represents over 30 per cent., Germany and Austria over 26 per cent. (viz.: the Hanse towns 12.46 per cent., the Zollverein 9.54, Austria 4), France over 14 per cent., Holland over 5 per cent., Russia over 4 per cent., Belgium over 3 per cent. Altogether over 66 per cent. of the aggregate value of European commerce falls to the share of the Germanic nations, while they number only 28.2 per cent. of the total population. The principal articles of food are the different kinds of grain, especially wheat and rye, though in some countries potatoes are to a large extent used as a substitute. The average annual quantity of breadstuffs consumed per head is: in Saxe-Altenburg, 10.92 bushels; in France and Würtemberg, 9.36; in Baden, 8.97; in Bavaria, 8.58–8.97; in England, 8.58; in Nassau, 7.8; in Prussia, Saxony, and Hesse, 6.24; in Luxemburg, 5.61. The annual consumption of meat exceeds 6,000,000,000 lbs.; the average per head is: in England, 80 lbs.; in Baden, 54; in Nassau, 52; in Bavaria and Würtemberg, 45; in Hesse-Cassel, 41; in France, Prussia, and Luxemburg, 40; in Saxe-Altenburg, 37; in Saxony, 36; in the grand duchy of Hesse, 35. The annual consumption of butter is near 5,000,000,000 lbs.; of cheese, over 2,000,000,000 lbs.; of milk, 22,500,000,000 gallons. The consumption of wine has for 10 years averaged 2,160,000,000 gallons; the annual average per head is: in France, 15 gallons; in the Palatinate, Würtemberg, Baden, and the grand duchy of Hesse, 6½–7½; in Rhenish Prussia, 3½–5; in Bavaria, 2½; in Nassau, 1½–2½; in Prussia and Saxony, ½; in England, 1.06 quarts. The average annual consumption of beer is: in Bavaria, 71.3 quarts; in England, 48 49; in Würtemberg, 47.3; in Saxony, 24.4; in Baden, 13.5; in Prussia, 13.11; in France, 9.7. The average consumption of alcoholic liquors is given by Reden at 13–14 quarts in Prussia, 11 in Hesse-Cassel, 6 in Saxony, 3.6 in Great Britain, 2 in Würtemberg, and 1.75 in France. The total consumption of coffee is, according to the same authority, 2,400,000,000 lbs. (average quantity per head in France 4.5 lbs., in the Zollverein 2.5, in Great Britain 1.1); of tea 70,000,000 lbs. (average per head 1.6 lb. in Great Britain; in the Zollverein not full $\frac{1}{10}$ part of a pound). Of sugar the average consumption is: in Great Britain 17 lbs., in France 6.56, in the Zollverein 4.88 per head. Of the total consumption of tobacco (over 5,000,000 cwt.), nearly 30 per cent. is the share of Germany.—Christianity is almost exclusively the religion professed by the nations of Europe. The 3 principal denominations, viz., Roman Catholic, Protestant, and Greek, correspond nearly to the 3 principal races, Latin, German, and Slavic. The aggregate number of Roman Catholics is about 134,000,000. They constitute almost the entire population of Italy, Spain, Portugal, and

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Russian Poland, 96 per cent. of the population of France, 76 per cent. of Austria, 71 per cent. of Bavaria, 52½ per cent. of all Germany, 82 per cent. of Ireland, 99½ per cent. of Belgium. Protestantism is the established faith in Great Britain and the Scandinavian kingdoms, and is professed by 96 per cent. of the population of Great Britain, 46½ per cent. of Germany, 57 per cent. of Holland, altogether by nearly 60,000,000 people. Greek Catholicism has 50,000,000 professors in Russia (83 per cent. of the total population), 10,000,000 in Turkey (66 per cent.), and about 6,000,000 in the Slavic provinces of Austria. Geographically Roman Catholicism is the dominant religion in the S. and S. W., Greek Catholicism in the E. and S. E., Protestantism in the N. and N. W. The number of Mohammedans is about 5,000,000 (3,500,000 in Turkey, the remainder in S. Russia), of Jews about 2,900,000, of Buddhists about 10,000 (Mongolian nomadic tribes in S. Russia), and of pagans about 1,000,000 (in the extreme N. of Russia).—Popular education, measured by the proportion of schools and pupils to the entire population, is more general in the countries inhabited by the Germanic race than among the Latin nations, and it holds the lowest place among the Slavic nations. In Saxony and the Thuringian principalities the proportion of pupils to the population is as 1 to 4; in Prussia, Sweden, and Norway, as 1 to 6; in Holland and Denmark, as 1 to 7; in England, as 1 to 8; in Austria and Scotland, as 1 to 10; in Belgium, as 1 to 10.5; in Ireland, as 1 to 12; in France, as 1 to 17; in Russia, as 1 to 93. Of the whole number of children under 15 years of age there remain without common-school education in Prussia 2.5 per cent., in Bavaria 20 per cent., in the German provinces of Austria 23 per cent., in Belgium 33 per cent., in France 44 per cent., in Spain 75 per cent., in Parma (Italy) 84 per cent., in Russia 90 per cent. In the higher branches of education Spain stands in the front rank. It has 8 universities with 8,400 students (1 to 1,630 of the whole population); next comes England (proportion of students to population as 1 to 1,795), then Sweden and Norway (1 to 1,800), Denmark (1 to 1,850), Portugal (1 to 2,624), Holland (1 to 3,230), Switzerland (1 to 3,285), Germany (1 to 3,419), France (1 to 3,440), Greece (1 to 3,610), Hungary (1 to 4,610), Russia (1 to 13,600). But in stating this proportion it is necessary to remark that the standard of professional education is very different in the countries named. What is termed a university in one country scarcely holds the rank of a college or an academy in another. Thus, Germany has only 22 universities proper, while it has hundreds of colleges (gymnasia), which, judged by the standard of the education they confer, would be entitled to the designation of universities in some other countries. Of educated men in Europe the Protestants have relatively the largest proportion; next come the Jews, then the Roman Catholics, and lastly the Greek Catholics. Agricultural colleges and polytechnic institutes have been introduced at a comparatively recent date in Great Britain, Germany, Switzerland, France, Belgium, and Russia.—To judge of the moral status of European society by the criminal statistics is impossible, on account of the incompleteness of our information. Something may be learned in this respect from the proportion of illegitimate to legitimate births. This is lowest in some portions of Russia, where it is 3.19 per cent. of the total number of births; in the Two Sicilies it is 5 per cent., in Holland 5.24, in Sardinia 6.66, in Prussia 7.04, in France and Belgium 7.34, in the duchies of Mecklenburg 8.93 and 9.61 respectively, in Hanover 8.93, in Austria and Portugal 10, in Würtemberg 10.98, in the petty Saxon duchies 12.19, in the grand duchy of Hesse 13.43, in the kingdom of Saxony 13.88, in the grand duchy of Baden 13.88, in Bavaria 23.25. A much more unfavorable proportion obtains in the larger cities. Thus of the entire number of births in Genoa, 8.07 per cent. are illegitimate, in Berlin and Frankfort 14.28, in Turin 18.87, in St. Petersburg 22.22, in Munich 36.34, in Paris 52.63, in Vienna 62.5, in Strasbourg 66.66, in Lyons 71.42. But as a measure of public morality these proportions are insufficient, since the facilities for marrying are very different in different states. In some cases, especially in Mecklenburg and other petty German states, the obstacles to legal marriage are so great that numbers of people prefer to live together in a state of what would be perfectly legal wedlock in Scotland or America, but is only concubinage by the local laws of those states.—The present political systems of Europe are the product of nearly 20 centuries of strife and war among the different races inhabiting the continent. Though at certain periods of peace political philosophers and statesmen have endeavored to demonstrate the existence of a certain balance of power, which, by keeping in check the ambition of conquerors, should serve as a guarantee for the continuance of the actual state of things, there are in the whole history of Europe scarcely any two succeeding generations during which this idea has been realized. There has always been an almost continuous shifting of boundaries irrespective of nationalities, and there is not one of the great powers that does not hold in subjection portions of other nationalities. Thus Russia holds several German provinces, Finland, and part of the former Polish kingdom, not to mention countries the people of which belong to the Mongolian race. Prussia has some Polish provinces; Austria rules over Hungary and parts of Poland and Italy; France, Holland, and Denmark over portions of Germany (Alsace, Lorraine, Luxemburg, Schleswig-Holstein). Scarcely anywhere on the European continent is the form of government the spontaneous outgrowth of the popular will, and hence there is no remedy against abuse of monarchical power except revolutions. The fear of these has in many states compelled the rulers to subject their power to certain constitutional

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restrictions, but, with the exception of Great Britain, Prussia, some of the smaller German states, Belgium, and Sardinia, constitutionalism is at best nominal. The relative rank of the different states is determined by their power to do mischief to each other, and the existence of most of the smaller states is simply owing to the jealousy of the greater ones. This is especially the case with the 8 republics which are tolerated in Europe (Switzerland, Ionian islands, San Marino, Andorra, and the free cities in Germany). Beside these, there are altogether 46 monarchical states, the rulers of which have different titles, such as emperor, king, grand duke, prince-elector, duke, prince, landgrave; but this difference in official titles does not imply any difference in sovereign power. These states are classified into those of the 1st, 2d, 3d, and 4th rank. The following are their names, area, and population, in 1859:

Names.	Form of government.	Area in sq. miles.	Population.	Date of constitution.
States of the first rank (the 5 great powers).				
Russia (in Europe)	Empire	2,120,997	60,122,669	1851
Austria	"	256,559	36,411,309	1854
France	"	203,736	36,039,364	1852
Great Britain and Ireland	Kingdom	120,851	27,017,328	1851
Prussia	"	107,300	17,202,351	1855
States of the second rank.				
Sweden and Norway	{ "	170,715	3,641,600	1855
	{ "	121,735	1,490,047	1855
Turkey (in Europe)	Empire	189,920	16,440,000	1845
Spain	Kingdom	176,480	15,850,000	1857
The Two Sicilies	"	41,221	9,117,000	1848
Portugal	"	34,500	3,499,121	1854
Sardinia	"	28,830	5,167,512	1857
Bavaria	"	29,677	4,541,556	1855
Denmark	"	21,900	2,468,718	1856
Holland, with Luxemburg	"	18,890	3,528,928	1856
Belgium	"	11,313	4,580,728	1856
States of the third rank.				
Greece	Kingdom	18,944	1,045,382	1857
Papal States	Popedom	17,048	3,124,668	1858
Switzerland	Confederated republic	15,261	2,391,478	1850
Hanover	Kingdom	14,600	1,819,777	1855
Tuscany	Grand duchy	8,712	1,793,967	1858
Würtemberg	Kingdom	7,568	1,788,720	1856
Baden	Grand duchy	5,904	1,856,948	1852
Saxony	Kingdom	5,705	2,089,075	1853
Mecklenburg-Schwerin	Grand duchy	4,701	589,231	1857
Hesse-Cassel	Electorate	4,430	736,392	1852
Hesse-Darmstadt	Grand duchy	3,761	856,424	1856
Oldenburg	"	2,479	287,160	1855
States of the fourth rank.				
Parma	Duchy	2,184	499,885	1857
Modena and Massa	"	2,078	604,519	1857
Nassau	"	1,736	454,064	1857
Brunswick	"	1,524	269,218	1857
Saxe-Weimar-Eisenach	Grand duchy	1,403	263,755	1855
Ionian Islands	Republic	1,097	226,894	1856
Mecklenburg-Strelitz	Grand duchy	997	99,628	1851
Saxe-Meiningen-Hildburghausen	Duchy	968	165,602	1857
Saxe-Coburg-Gotha	"	799	150,878	1855
Anhalt-Dessau-Köthen	"	678	114,850	1855
Reuss	Principalities	588	119,000	1857
Saxe-Altenburg	Duchy	491	133,598	1857
Waldeck	Principality	455	58,189	1855
Lippe-Detmold	"	445	105,650	1855
Schwarzburg-Rudolstadt	"	405	68,974	1855
Schwarzburg-Sondershausen	"	358	61,452	1855
Anhalt-Bernburg	Duchy	339	58,475	1855
Hesse-Homburg	Landgraviate	206	24,937	1855
Lippe-Schaumburg	Principality	205	29,848	1855
Andorra	Republic	190	7,000	....
Hamburg	Free city	149	229,401	1857
Lübeck	"	142	55,423	1857
Bremen	"	110	88,556	1856
Frankfort	"	91	74,784	1855
Lichtenstein	Principality	59	7,150	1857
Monaco	"	50	7,000	....
San Marino	Republic	21	7,800	1856
Total		3,775,425	271,775,357	

According to F. W. von Reden's statistical tables (1854), the yearly revenue of all the European states is $1,324,832,394, of which sum $595,534,191 belongs to the Germanic states, $476,192,762 to the Latin or Romaic states, $213,810,347 to Russia, $32,413,857 to Turkey, and $3,071,645 to Greece. The average of revenue is, in Great Britain $9.37 per head, in France $8.26, in Austria $3.06, in Prussia $4, in Switzerland $2.51 (the lowest proportion in all Europe). The public debt of all European states amounted before 1850 to $9,264,240,000, of which sum over $6,000,000,000 was the public debt of the 5 great powers. But since then

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the extraordinary expenditure caused by the Crimean war of 1854–'56, and the Franco-Sardinian war against Austria in 1859, has increased the indebtedness to near $12,000,000,000. Before the last oriental war the proportion of the public indebtedness to the population was, in all Europe, $35.28 per head, in Holland $187.92, in Hamburg $129.60, in Great Britain $128.52, in Spain $120.96, in Lübeck $92, in Frankfort $73.44, in France (1858) $46. Only a few states of the fourth rank were entirely free from debt, viz.: Lichtenstein, the principalities of Lippe and Reuss, Mecklenburg-Strelitz, Modena, Waldeck, and San Marino. The paper currency of Europe amounted about 1850 to $846,000,000, but it has since been increased, so that its aggregate amount undoubtedly exceeds $1,000,000,000. The amount of coin was approximatively stated at $1,700,000,000 in 1850.—The military establishments of Europe include in time of peace 2,731,000 men, kept at an expense of $300,000,000. The proportion of the principal powers is:

Countries.	Men.	Expenditure.
Russia	790,000	$54,720,000
Germany:		
Austrian empire	530,000	$41,040,000
Prussia	129,000	19,440,000
Lesser states	161,000	12,960,000
	820,000	73,440,000
France (exclusive of Algiers)	385,000	59,000,000
Turkey	188,000	15,000,000
Gt. Britain & Ireland	102,000	45,000,000

The navies of Europe consist of over 3,000 vessels, carrying over 30,000 guns, with 250,000 men, at a yearly expenditure of over $125,000,000.

EUROTAS, in ancient geography, a river of Greece, in Laconia, which had its source near the frontiers of Arcadia, flowed by the city of Sparta, and emptied into the gulf of Laconia. The Spartans rendered to it divine honors, and its banks, shaded by olives, laurels, and myrtle trees, were very beautiful.

EURYDICE, the name of several historical and mythological persons, the best known of whom was the wife of Orpheus. Persecuted by Aristæus, she trod in her flight upon a snake, and was bitten to death; her husband followed her to the regions below, and by the charm of his lyre obtained from Pluto permission for her to return; but lost her again, having broken the condition of not looking back after her.

EUSEBIUS, surnamed Pamphili, to commemorate his friendship with the martyr Pamphilus, the father of ecclesiastical history, and next to Origen the most learned of the Christian teachers of antiquity, born in Palestine about A. D. 264, died about 340. He early devoted himself to the study both of Christian and pagan antiquities, visited the monks of the Thebais, in Egypt, witnessed and shared the persecutions to which the Christians of that region were subjected, and gathered those incidents and confessions which he has transmitted to us in his history. About 314 he became bishop of Cæsarea. In his time Arianism began to be formidable, and, regarding the controversy as of less vital importance than most of his contemporaries, he sought to find a mean between the opinions of Arius and the extreme orthodoxy of Athanasius. His aim was to conciliate, and his works are more strongly characterized by political complaisance than by dogmatic consistency. At the council of Nice he sat on the right hand of the emperor Constantine, whose favor he enjoyed throughout his life, and made the first draft of the Nicene creed; this, however, was modified to suit the more orthodox views of the majority, and he signed the creed as finally adopted with some reservation. His "Ecclesiastical History," written in Greek, in 10 books, and in the composition of which he had the use of numerous libraries and of the archives of the empire, recounts the events of the church from its beginning to the year 324. It was continued by Socrates, Sozomen, and Theodoret, and was translated by Rufinus into Latin and continued to 395. His "Evangelical Preparation" preserves many passages from the ancient authors, and exposes the reasons why the learned as well as the vulgar paganism of Greece and Rome should be abandoned for Christianity. A portion only of his "Evangelical Demonstration" remains, in which he shows that the Mosaic law was only preparatory. His "Onomasticon" is a nomenclature of the cities and places mentioned in Scripture, and his "Chronicle" is an abridged statement of events from the beginning of the world to the 20th year of the reign of Constantine. Fragments only of this chronicle were known, till in 1784 an Armenian version was discovered, which was published by Mai and Zohrab at Milan in 1818, and which gave occasion for a dissertation of Niebuhr showing the new dates and events which this discovery made known. Eusebius wrote under the pressure of the great commotions of his age, but with much freedom from prejudices, with a more critical spirit than many both of his predecessors and successors, and with an ecclesiastical erudition unsurpassed in his age.—The principal editions of the "Ecclesiastical History" are those of Stephens (fol., Paris, 1544), Valois (fol., Paris, 1659), Reading (Cambridge, 1720), and recently those of Heinichen (2 vols. 8vo., Leipsic, 1829) and Burton (Oxford, 1838). Translations have been made of it into Latin by Rufinus, who took great liberties with the Greek text; into French by Louis Cousin; into German by Stroth (1778), and into English by Parker (1703), Cater (1736), Dalrymple (1778), and Crusé. The last-named translation is reprinted in Bohn's "Ecclesiastical Library" (London, 1852). There is no complete Greek edition of the works of Eusebius; the best complete Latin edition is that of Paris, 1580, containing all his writings then known.

EUSTACHI, or Eustachio, Bartolommeo, (Lat. *Eustachius*), an Italian anatomist, born probably at San Severino, near Salerno, died in Rome in 1574. He was a contemporary

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of Vesalius, and shares with him the merit of laying the foundation of the science of human anatomy. He extended the knowledge of the internal ear, by giving a correct description of the tube between the throat and the ear, which has been called after him the Eustachian tube. He was also the pioneer in the accurate study of the anatomy of the teeth. His *Tabulæ Anatomicæ*, the text to which seems to have been lost, were first published in 1714 by Lancisi. Eustachi, who officiated as professor of anatomy and as physician to the cardinals Borromeo and Rovero, seems to have been so poor that he was unable to publish his works. Lauth remarks that if he had been able to publish them, anatomy would have attained the perfection of the 18th century 200 years earlier at least. A new edition of the *Tabulæ* was published by Albinus with an excellent commentary (Leyden, 1743). A Dutch commentary by Bonn appeared in Amsterdam in 1798; and one in German by Krauss in the same city in 1800.

EUSTIS, William, an American physician and politician, born in Cambridge, Mass., June 10, 1753, died in Boston, Feb. 6, 1825. He was graduated at Harvard college in 1772, and subsequently studied medicine. He entered the American army during the revolutionary contest as a regimental surgeon, and served throughout the war in that capacity, or as hospital surgeon, being for some years stationed at the house opposite West Point in which Arnold had his head-quarters. Upon the conclusion of the war he practised his profession in Boston. Between 1800 and 1805 he was one of the representatives from Massachusetts in congress, and in 1809 he was appointed by President Madison secretary of war, a position which he retained until the surrender of the American forces under Gen. Hull to the British in 1812, when he resigned. In 1814 he was appointed minister to Holland, and after his return served again in congress between 1820 and 1823. In the latter year he was elected governor of Massachusetts, and died while holding that office.

EUTAW SPRINGS, a small affluent of the Santee river, in S. Carolina, about 60 m. N. W. from Charleston, near which was fought, Sept. 8, 1781, a battle between the Americans under Gen. Greene and the British under Col. Stuart. Greene had been several weeks awaiting reënforcements on the Santee hills, when on Aug. 22 he broke up his encampment to march against Stuart, who had succeeded Rawdon in command of all the British troops in the field, and who was stationed on the Congaree, 16 m. distant, across a marshy country. The latter moved down 40 m. to the vicinity of Eutaw Springs, followed by Greene at easy marches, who bivouacked on the night of Sept. 7 within 7 m. of the enemy. The whole American force, not exceeding 2,000 men, advanced in two columns, the first of which was commanded on the right, left, and centre respectively by Gen. Marion, Gen. Pickens, and Col. Malmedy, and the second by Gen. Sumner, Col. Williams, and Col. Campbell. The number of the enemy was about 2,300. Four miles from Eutaw a reconnoitering detachment of British cavalry was put to flight after a severe skirmish. One mile from the British camp a body of infantry was encountered, which soon fell back. The action became general soon after 9 o'clock, and after a sharp contest the British were driven from their camp. The American soldiers had scattered among the tents of the enemy, plundering and drinking, when Stuart suddenly renewed the battle, maintaining a severe fire from the windows of a house and from a palisadoed garden. Greene withdrew the American troops out of range, deciding, as the enemy could maintain themselves but a short time, to wait and attack them on their retreat. He left a strong picket on the field, and returned for the night to the position 7 miles off which he had left in the morning, not finding water nearer. During the night the British retreated toward Charleston; and on the next day Greene advanced and took possession of the battle field, and sent detachments in pursuit of them. The British lost 133 killed and wounded, and 500 who were made prisoners. The American loss was 535 in killed, wounded, and missing. One of the most lamented of the slain was Col. Campbell, who fell early in the battle bravely leading the Virginians in a charge with the bayonet.

EUTERPE (Gr. εὖ, well, and τέρπω, to delight), the inspirer of delight, one of the nine muses, daughter of Zeus and Mnemosyne (memory). She presided over lyric poetry, and played on the flute, of which she was the inventor; according to some, she also invented tragedy. She is usually represented as a virgin, crowned with flowers, with a flute in her hand, or various musical instruments around her, and sometimes as dancing.

EUTYCHES, a heresiarch of the 5th century, born A. D. 378, died about 454. For many years he lived as a priest and archimandrite in the cloisters of Constantinople, where he had more than 300 monks under his direction. He was the head of the party opposed to Nestorius, who, in order not to confound the divine and human natures in Christ, had affirmed that there were in him two distinct persons. Eutyches, in his zeal for singleness of person in Christ, was led to maintain also that he possessed but one nature. This opinion became popular in the Alexandrian church, where the doctrines of Nestorius had been most loudly condemned. The rising heresy was examined and condemned by a synod at Constantinople in 448. The influence of Eutyches and his friends obtained from Theodosius the reference of the matter to a general council to meet at Ephesus in 449 under the presidency of Dioscurus, a violent Eutychian. Here the triumph of Eutyches was secured by the outcries of monks, the threats of soldiers, and the overbearing violence of the president; and the most prominent hostile bishops were deposed. Pope Leo refused to recognize the acts of this council, which was

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known as the Latrocinium, or robber synod, and excommunicated Dioscurus; and at the general council of Chalcedon in 451 both the doctrines of Nestorius and of Eutyches were condemned. In the 6th century a great revival of the doctrine took place under the auspices of the monk Jacob Baradæus, who died bishop of Edessa. From him the sect took the name of Jacobites, who still constitute a numerous church in Egypt, Syria, and Ethiopia. The emperor Heraclius sought to mediate between the Monophysites and Catholics, and promulgated a decree in 630, requiring the doctrine to be taught that there were two natures in Christ, but only a single will. Hence the name of Monothelites, the last offshoot of the heresy of Eutyches.

EUXINE SEA. See BLACK SEA.

EVAGORAS, king of Salamis in Cyprus, flourished about the beginning of the 4th century B. C. His family, which claimed descent from Teucer, the reputed founder of Salamis, after having long held the sovereignty of that city, had been expelled by a Phœnician exile. Evagoras recovered the kingdom in 410 B. C., and endeavored to restore in it the Hellenic customs and civilization, which had almost disappeared under the long domination of barbarians. He gave a friendly reception to the Athenian general Conon, after the defeat at Ægospotamos; it was by his intercession that the king of Persia permitted the Phœnician fleet to aid Conon; and he himself commanded the Cypriote squadron which joined Conon and Pharnabazus at the battle of Cnidus. For these services a statue was erected to him at Athens in the Ceramicus by the side of that of Conon. His increasing power attracted the jealousy of the Persian king Artaxerxes II., who declared war against him. Evagoras immediately extended his power over almost the whole of Cyprus, ravaged the coasts of Phœnicia, excited the Cilicians to revolt, and even captured the city of Tyre; but a Persian army, landing in Cyprus, recaptured the island and besieged Evagoras in his capital. He was saved only by the dissensions of his enemies, and was able to conclude in 385 a peace by which the sovereignty of Salamis was secured to him. He survived this treaty 10 years, and died by assassination.

EVANGELICAL, a term applied to those denominations of Christians which make the atonement of Christ alone, and not the performance of moral duties, the ground of salvation. It is often used as synonymous with orthodox. In Prussia it is applied in state documents to the Lutherans and Calvinists, whom the government has shown a strong disposition to unite.

EVANGELICAL ASSOCIATION, an ecclesiastical body, sometimes, though erroneously, called the German Methodist church, probably because its confession of faith and its polity are very similar to that of the Methodist Episcopal church, while its members are chiefly, though by no means exclusively, Germans, or of German descent. It took its rise in the year 1800, in the eastern part of Pennsylvania, and resulted from an organization into classes and congregations of the disciples of the Rev. Jacob Albright, a native of eastern Pennsylvania, who being impressed by the general decline of religious life, and the corruption of doctrines and morals that prevailed in the German churches in that portion of the country, undertook about 1790 to work a reform among them. The effect of his first preaching encouraged him to travel through a great part of the country at his own expense, preaching the gospel as he had opportunity, in churches, in schools or private houses, in the public roads, &c. Although he commenced his labors without any ulterior design of forming a distinct ecclesiastical organization, yet he soon found it necessary to unite his converts, scattered over several counties, into small societies for mutual support and sympathy. At a meeting called for the purpose of consulting upon the best measures to be adopted for the furtherance of a cause in which they all felt a deep interest, the assembly, without regard to the teachings of high-churchism respecting a valid Christian ministry, unanimously elected and solemnly ordained Mr. Albright as their pastor, authorizing him to exercise all the functions of the ministerial office over them, and declared the Bible to be their rule of faith and practice. This organization, though incomplete at first, was soon after considerably improved by the adoption of a creed and rules for church government. In the course of time, as laborers increased, and the society spread, annual conferences were held; and in 1816, 16 years after the first organization of the church, a general conference was held for the first time in Union co., Penn., which consisted of all the elders in the ministry. Since 1843, a general conference, composed of delegates elected by the annual conferences from among their elders, has held quadrennial sessions. This body constitutes at once the highest legislative and judicial authority recognized in the church. The ministry is divided into two orders, deacons and elders; and, faithful to the principles and example of their founder, they practise itinerancy. Its highest permanent order is the eldership; for, although the society has its bishops and presiding elders, yet these, to be continued, must be reëlected every 4 years; and if not reëlected, they hold no higher rank or privilege than that of an elder. For the first 25 years of its existence, the society struggled against violent opposition, but for the last 30 years it has made rapid progress, so that in Jan. 1859, it comprised 8 annual conferences, consisting of over 300 itinerant and a still greater number of local preachers, whose field of labor extends over nearly all the free states except New England, beside Maryland, Virginia, and the territories, and to some extent also in Canada. The membership approximates 40,000, all adults, and sustains, beside its ministry, about 65 missions in the various states and territories

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of the Union, chiefly among the Germans, and 2 missionaries in Germany, in the kingdom of Würtemberg. Two flourishing institutions of learning are also sustained by the church, one at New Berlin, Union co., Penn., and the other at Greensburg, Summit co., Ohio. Its prosperous publishing house at Cleveland, Ohio, issues 3 periodicals: one, its German organ, *Der Christliche Botschafter*, which is the oldest German religious paper published in America; another, its English organ, "The Evangelical Messenger;" and the third, *Der Christliche Kinderfreund*, a non-denominational German juvenile monthly. The society forbids its ministers and members the use of intoxicating liquors as a beverage, and refuses church fellowship to manufacturers and vendors of them, as well as to slaveholders and slave traders. In theology it is Arminian, but holds the essential doctrines of the gospel as they are held in common by the various evangelical churches of our land, with all of whom it aims to cultivate a fraternal spirit.

EVANGELIST (Gr. *ευ*, well, happily, and *αγγελω*, to announce), one who brings good tidings. Hence the writers of the four Gospels are called the evangelists, because they, in a preëminent sense, declare the glad tidings of salvation by Christ. Evangelists were early designated as a particular class of religious teachers in the Christian church, next in order to the apostles, and under their direction; not attached to any particular church or place, but going forth to preach the gospel wherever they were called or sent, and to travel among the infant churches, ordain their ordinary officers, and finish the work the apostles had begun. The primitive order of evangelists, distinct from other public religious teachers, is supposed to have been merely temporary, like that of apostles and prophets. Their extraordinary powers and miraculous gifts have long since ceased; but the class of duties and services which they performed seems to have fallen more especially on the missionaries of modern days.

EVANS, Sir De Lacy, a British general, born in Moig, Ireland, in 1787. He became ensign in the 22d regiment of foot, and his first service was with the British army in India, where, from 1807 to 1810, he shared in the war against Ameer Khan. He also assisted at the captnre of the Manritius. In 1810 he joined his regiment in Spain. He was present at nearly all the principal battles and sieges, and was noted for volnnteering for storming parties and other dangerons duties; receiving the war medal, with 3 clasps, for his share in the actions of Vittoria, the Pyrénées, and Toulouse. Early in 1814, having become brevet lieutenant-colonel of the 5th West Indian regiment, he was ordered for service in America. At the battle of Bladensburg, Aug. 24, 1814, he had 2 horses killed under him. It was he who, at the head of 100 men, acting under orders from Gen. Ross, forced the capitol at Washington. He also took part in the attack on Baltimore. At New Orleans he was the only landsman who volnnteered to accompany the expedition against the American sloops which defended Lake Borgne. In Dec. 1814, and again, in Jan. 1815, he was wounded before New Orleans, and was sent home. He recovered just in time to join Wellington at Quatre Bras, where again he had 2 horses killed under him. After the peace of Paris he returned to England. Until the time of the reform agitation, on the accession of William IV., he remained in private life. In 1830 he came forward as a radical reformer, was for a few months a member of parliament for Rye, but lost his seat at the general election of that year. He was reëlected in 1831, and unsuccessfnlly contested the borough of Rye as well as the city of Westminster in 1832, and represented the latter from 1833 to 1841. In 1835 the British government gave permission to the Spanish anthorities to enlist a "British auxiliary legion" of 10,000 men, to serve against the cause of Don Carlos. Evans accepted the command of this force; bnt no sooner was the legion enrolled than the policy which originated it fell into disfavor, and discouragements were thrown in its way, the resnlt of which was that Evans found himself on Spanish soil with an undrilled multitnde, the refnse of the streets. By degrees they were brought into serviceable condition, and at the end of the 2 years for which they were engaged, Evans was able to state in his place in parliament that no prisoner had been taken from the legion in action, nor any part of its artillery or equipage captured, while it had taken from the enemy 27 pieces of artillery and 1,100 prisoners. In 1846 he was reëlected to parliament from Westminster, and has retained this seat ever since. When the Crimean war broke out he was appointed, with the rank of lieutenant-general, to command the 2d division of the English army. At the battle of the Alma his division was distinguished, and again before Sebastopol, where, on Oct. 26, they repulsed a sortie of 6,000 Russians, of whom they put 800 *hors de combat*, and took 80 prisoners. At the battle of Inkermann, Nov. 5, when the Russians attacked, Gen. Evans was sick on shipboard at Balaklava, Gen. Pennefather having temporary command of his division. Evans hurried on shore, and acted as Pennefather's assistant, rather than deprive him of the honor of the day. He received for his services the thanks of parliament and the grand cross of the bath, and Louis Napoleon made him grand officer of the legion of honor (1856). He abstained from voting on the Chinese war question (1857), is opposed to the present system of selling commissions in the army, and voted against the Derby reform bill (1859).

EVANS, Lewis, an American geographer and surveyor, born about 1700, died in June, 1756. During an active professional life, he collected many materials for a map of the British North American colonies, and in 1749 published one of the middle colonies, chiefly of New York,

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New Jersey, and Delaware, and of the Indian country adjacent. A 2d edition appeared in 1755, much enlarged, and containing in addition Virginia, Maryland, Pennsylvania, and a part of New England. In 1756 he published in London a pamphlet in reply to some strictures on a statement questioning the English title to Fort Frontenac which had been appended to the last edition of his map. Both publications appeared under the title of "Geographical, Historical, Political, Philosophical, and Mechanical Essays, Nos. 1 and 2."

EVANS, OLIVER, an American inventor, born in Newport, Del., in 1755, died in New York city, April 21, 1819. The inventive faculty was developed in him while he was apprentice to a wheelwright, and before he had reached the age of manhood the construction of a land carriage to be propelled without animal power began to occupy his attention. At the age of 22 he invented a machine for making card teeth which superseded the old method of manufacturing them by hand. Two years later he entered into business with his brothers, who were millers, and in a short time invented the elevator, the conveyor, the drill, the hopper-boy, and the descender, the application of which to mills worked by water power effected a revolution in the manufacture of flour. For some years after these improvements were perfected, the inventor found much difficulty in bringing them into use, although in his own mill the economy of time and labor which they effected was very manifest. In 1786–'7 he obtained from the legislatures of Maryland and Pennsylvania the exclusive right to use his improvements in flour mills, and the former state also gave him a similar privilege with respect to steam carriages, more from the desire to encourage his inventive powers than from a belief that he could ever derive any benefit from it. It was not until 1799 or 1800 that he was able to set about the construction of a steam carriage; but finding that his steam engine differed in form as well as in principle from those in use, it occurred to him that it could be patented and applied to mills more profitably than to carriages; and in this he was completely successful. This was the first steam engine constructed on the high pressure principle; and to Evans, who had conceived the idea of it in early life, and in 1787 and again in 1794–'5 had sent to England drawings and specifications, the merit of the invention belongs, although it has been common to assign it to Vivian and Trevethick, who had had access to Evans's plans. In 1803–'4, by order of the board of health of Philadelphia, he constructed the first steam dredging machine used in America, consisting of a flat scow with a small engine to work the machinery for raising the mud. The machine, which he named the "Oructor Amphibolis," having been placed upon wheels, propelled itself to the Schuylkill, a distance of 1¼ miles, and upon being fitted with a paddle wheel in the stern, navigated the river to its junction with the Delaware. This is believed to have afforded the first instance in America of the application of steam power to the propelling of land carriages. He indeed predicted the time when such carriages would be propelled on railways of wood or iron, and urged the construction of a railroad between Philadelphia and New York, but was always prevented by his limited means from prosecuting his mechanical experiments to the extent he desired. He was the author of the "Young Millwright's Guide," and the "Young Steam Engineer's Guide," and wrote with force and facility on his favorite subjects.

EVANSVILLE, a city and the capital of Vanderburg co., Ind., built on high ground on the N. bank of the Ohio river, 200 m. from its mouth, and 200 m. below Louisville, Ky.; pop. in 1853, 8,000; in 1859, about 15,000. The bend of the river at this point describes a half moon, whence Evansville is sometimes call the "crescent city." The Wabash and Erie canal, 462 m. in length, commencing at Toledo, Ohio, terminates at this point; and the Evansville and Crawfordsville railroad, in operation from Evansville to Terre Haute, opens railroad communication with almost every part of the country. The geographical and geological position of the place is favorable to the building up of a large manufacturing and commercial city. Coal and iron ore abound in the vicinity; several large flouring mills, factories, and machine shops are now in operation; and 3 daily and 2 weekly newspapers are published. The value of merchandise sold in 1857 was $4,076,000; of manufactures, $1,598,708; of exports, $7,053,216. The city contains 22 church organizations, of almost all denominations, 3 public libraries, a national marine hospital erected by the general government, and public schools attended by 1,446 pupils. Evansville was laid out in 1817 by Gen. Robert M. Evans, James W. Jones, and Hugh McGeary, from the first of whom it was named. In 1857, some laborers digging a well came upon the remains of a cabin 18 feet below the surface of the earth. In the interior were found an old-fashioned spring wheel, a wooden mall, and a pair of European boots. It is surmised that the cabin may have been inhabited by the early French settlers, and that it had been erected in an excavation, and covered over with earth to conceal it, as was frequently done by the early settlers of the West.

EVAPORATION, the dissipation of bodies by the volatile particles at their surface assuming the form of vapors and disappearing in the space around them. Liquids manifest this property most sensibly. Mercury exhibits it at temperatures exceeding 60° F., as is shown by the invisible fumes forming an amalgam upon the surface of a bit of gold leaf, suspended for some days over the surface of the metal. Many solid bodies are subject to it; camphor, ice, snow, and others, wasting away by their particles being taken in invisible vapor into the surrounding atmosphere. It is a part of the process provided by nature for restoring to the earth, through the medium

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of the clouds, the waters which have drained from its surface into the sea, and those also held in the soil, or upon the leaves of the forest. Once having performed their office, they are recalled by the process of evaporation, purified by it of their earthy contaminations, and are again poured out for the refreshment of vegetable and animal life. (See ATMOSPHERE, COLD, DEW, HEAT, and ICE.) As evaporation takes place in ordinary temperatures only from the surface of objects, the amount of moisture removed is dependent, under the same circumstances in other respects, upon the extent of surface exposed. It is greater in a warm dry air than when the temperature is low, or the atmosphere is already nearly filled with vapor. The more moisture is taken up into the same body of air, the more the process is retarded, until at length it is entirely checked. It is renewed by new supplies of dry air. The most favorable natural conditions for its rapid action are presented upon the Atlantic ocean under the trade winds, which strike off from the hot deserts of Africa, and blow across to the Cordilleras. The Amazon and the Orinoco are the fruits of the evaporation thus produced. The vapors that are continually ascending from moist surfaces are for the most part invisible, like those exhaled by breathing. Their existence is proved by instruments called hygroscopes and hygrometers; and at times they become visible, as when in clear frosty weather they rise copiously from the surface of pools fed by deep springs, and are seen congealed in white clouds, like the vapors of the breath under the same conditions. But unless deprived of their heat they possess the properties of gaseous bodies; a given bulk of air or of other gases takes up of them the same quantity as would be received in a vacant space of the same extent and temperature. This was conclusively proved from the experiments of Dr. Dalton. It results that no more vapor can be received into any space after the weight of that already there amounts to the elastic force of the vapor at the temperature of the surface which generates it. Increase of temperature adds to the elasticity of the vapor and promotes evaporation; cold reduces the elasticity and promotes precipitation. Pressure does not affect the capacity of air to contain vapor; but evaporation proceeds more slowly by its increase. If it be removed, as when a liquid is placed in an exhausted receiver of an air pump, evaporation goes on with great rapidity. Ether may thus at ordinary temperature be thrown into ebullition. A difference is observed in the tendency of different liquids to pass into vapor; the lower their boiling point the more rapid is their evaporation; but it is also observed that the vapor thus easily produced is correspondingly less rare, occupying less space than that requiring a greater expenditure of heat for its evolution. The density of alcoholic vapor is 2.5 times greater than that of water. Fluids, therefore, that may be vaporized at little expense of fuel, might not, after all, even if obtained at little cost, have any advantage over water in generating mechanical power. Dalton discovered that the presence of air or any gas impeded evaporation by the resistance its particles opposed to the circulation of the vapor; but whether any gas were present or not, the same amount of vapor would always be formed at the same temperature. The effect of the air was seen in the longer time required to fill the space with the amount of vapor belonging to the temperature. Vapors have a greater capacity for heat than their particles when condensed into liquid or solid form. In their formation consequently they abstract heat from surrounding bodies, producing an amount of cold corresponding to the rapidity of the process. Under the exhausted receiver of an air pump water is very rapidly converted into vapor, but the process is soon checked by the vacuum becoming filled with the vapor. By placing in the receiver a substance that rapidly absorbs aqueous vapor, as sulphuric acid, the operation goes on without check, and the cold produced is so intense that the water may be frozen, as was first demonstrated by Leslie, by its own evaporation. If liquids that evaporate more readily than water, as benzole or ether, are used, mercury itself may be frozen under them. Upon this principle the intense cold is obtained that is required for the solidification of carbonic acid gas. Heat may be abstracted so much more rapidly than it is imparted by surrounding bodies that even mercury may be frozen, as was done by Faraday, in a red-hot crucible. The principle is applied in the water and wine coolers used in hot countries. The water with which they are filled, and in which the wine bottles are placed, filters through the porous vessels and evaporates from their surface, cooling all the contents. A similar effect is experienced in the animal body by rapid evaporation. The heat generated by the chemical actions going on within is taken off by the vapor formed at the surface. Damp clothes furnish the means for the production of much vapor and consequent reduction of temperature, often to an injurious extent. The heat abstracted by vapor in its formation is given out on its condensation. In low pressure steam engines it is economized by being transferred in the condensers to the water that is returned to the boilers.—Hygroscopes and hygrometers, already referred to, are instruments designed, the first for detecting the presence of moisture in the atmosphere, and the second for determining either the temperature at which the air under observation begins to shed its moisture, called the dew-point, or else the temperature of evaporation. Either of these and the normal temperature of the air being known, the elastic tension of the atmospheric vapor, and the amount of moisture in a given quantity, are approximately ascertained by reference to tables constructed for this purpose. The results cannot be considered exact, as the air does not always contain just the amount of moisture due to its temperature. The hygroscope of De Saussure was a hair connected with a

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dial, its variations in length indicating the presence of more or less moisture. (For an account of these instruments, see HYGROMETER.) The elastic force given in the tables for any temperature of the water is expressed by the height in inches of a column of mercury which will balance it; but this is to be diminished by the force of the vapor that may already be present in the air, also obtained from the same table. The amount of water that may be evaporated at any given temperature from a square foot of surface in a minute of time is thus readily calculated, on the supposition that the air is previously dry. If it be continually removed from over the surface of the water by wind, natural or artificial, the operation is of course more rapidly accomplished.—Evaporation is accompanied with ebullition when the elastic force pressing upon the surface of a liquid is less than that due to the temperature of this liquid. In the case of water at the ordinary pressure of the atmosphere, and under ordinary circumstances, the particles of fluid throughout the mass are converted into vapor as rapidly as they acquire the temperature of 212°. The evolution of this vapor, generated in all parts of the liquid, throws it into the state of commotion called ebullition. By taking off the outside pressure by the air pump, or by ascending to great elevations above the surface, the same phenomenon is exhibited at reduced temperatures. (See BOILING POINT.) The quantity of heat required to convert a quantity of water into vapor is 5½ times as much as will raise it from the freezing to the boiling point. Steam consequently contains 5½ times as much heat as the water producing it when at the boiling point; yet the thermometer indicates no higher degree of temperature in the steam than in the water. The heat, however, reappears when the steam is condensed into water, sufficient being then developed to raise 5½ times as much water as produced it from the freezing to the boiling point.—The principles developed by the philosophical researches in the evaporation of liquids have been applied in a variety of ways to facilitate and render more economical several practical operations. Sirups are evaporated, as in the refining of sugar, in vacuum pans, or vessels in which the atmospheric pressure may be partially taken off by air pumps. A low degree of heat only is thus required, producing economy in fuel, and avoiding the risk of overheating and burning the sirup. Extracts are conveniently prepared on the same principle. But when it is desirable to effect the boiling at high temperatures, as for digesting bones and subjects difficult to dissolve, the evaporation is prevented by the vapor being confined, so as to exert its elastic force upon the surface of the fluid. Thus the escape of more steam is checked until, by greater heat, its elastic force is made greater than that upon the surface. By this method the temperature of the water has been raised to more than 400° F. Rapid evaporation has been promoted in salt works and in bleacheries by causing currents of air to blow over the extended surfaces of the liquids, thus constantly bringing new portions of dry air to absorb fresh quantities of moisture.—Some remarkable phenomena exhibited by liquids when dropped upon heated surfaces may properly be here noticed. Every one must have observed the tendency of water, when it falls upon red-hot iron, to separate into spherical drops, which dance around upon the metal, apparently without touching it, and thus continue without evaporating much longer than the fluid would if exposed to the same degree of heat under other circumstances. A platinum crucible brought nearly to a white heat may be almost half filled with water introduced drop by drop, which will continue in this state for some minutes without perceptible evaporation. On cooling the crucible, the liquid suddenly begins to boil, and discharges a volume of vapor. While in the spheroidal state drops are seen to be supported upon an atmosphere of vapor, which prevents their contact with the surface of the metal. Most liquids, except oils which are decomposed by the heat, display the same phenomena. Their temperature while in this condition is not only much less than that of the surface upon which they rest, but is also below their own boiling point; and if they are already boiling when dropped upon the heated surface, the temperature falls to a certain point, which appears to be a fixed one for each liquid in this condition. Water remains at 205°; alcohol, which boils at 173°, falls at least 8°; ether, which boils at 100°, falls at least 5°. The temperature of the heated surface at which liquids are caused to assume this condition has been found, for water, to be 340° or more; for alcohol, 273°; and for ether, 140°. The check upon evaporation is very remarkable. A quantity of water which would ordinarily disappear in vapor in one minute at the temperature of 212°, has been kept from total dispersion nearly an hour in a metallic vessel heated nearly to redness. Sulphurous acid, which is the most volatile of fluids, can be kept from evaporation only under a pressure of two atmospheres, equal to 30 lbs. to the square inch, or at a temperature below 14° F., which is its boiling point. This being dropped into a hot crucible, its temperature falls to 12°, and water poured in at the same time is immediately frozen. That the surface of the spheroids is not in contact with the hot surfaces is proved by dropping nitric acid upon a hot silver plate, where no chemical action is observed to take place; but if a piece of cold silver be brought in contact with the acid spheroid, nitrous acid fumes immediately appear, and nitrate of silver is formed. The light of a candle also may be seen between a metallic surface and an opaque spheroid spinning upon it. The protection thus afforded against the heat is exemplified also by the fearful experiment of thrusting the hand into molten metal, as cast iron or copper, which has several times been done with impunity; the moisture

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upon the hand forming the protecting stratum of vapor between it and the hot metal. A feat of this kind is described by Beckmann in the chapter on "Jugglers" in his "History of Inventions," as having been performed in his presence in 1765 at the copper works at Awestad, by one of the workmen, who took the melted metal in his hand, and again skimmed with it a ladle of the same, and moved his hand backward and forward in it. M. Boutigny also (to whose researches in this direction, as well as those of Charles Tomlinson, Esq., the author of the "Student's Manual of Natural Philosophy," and more recently of the "Cyclopædia of the Useful Arts and Manufactures," we are much indebted for the knowledge we possess upon this subject) has performed, together with M. Michel, similar experiments with cast iron. The last named states: "I divided or cut across with my hand a jet of cast iron, issuing from a cupola furnace, and I also plunged my other hand into a ladle of cast iron in the molten state, which was fearful to look at. I trembled involuntarily in making the trial, but both hands escaped uninjured." The subject is fully treated in Bonchardat's *Physique élémentaire* (Paris, 1851). The sudden formation of vapor produced by the spheroids assuming the gaseous state as the metallic surface is cooled, is probably one of the causes of the explosion of steam boilers. When these have become overheated by deficiency of water, that which is next introduced is likely to assume the spheroidal form. As more is added the metal is cooled, and the spheroids suddenly burst into vapor, every cubic foot producing 1,700 cubic feet of steam.

EVARTS, Jeremiah, secretary of the American board of commissioners for foreign missions, born in Sunderland, Vt., Feb. 3, 1781, died in Charleston, S. C., May 10, 1831. He was graduated at Yale college in 1802, and after some time spent in teaching, commenced the study of law in New Haven. He was admitted to the bar in 1806, practised his profession in New Haven for about 4 years, and then undertook the editing of the "Panoplist," a religious monthly magazine published at Boston. In 1812 he was chosen treasurer of the American board of commissioners for foreign missions, and in 1820, when the "Panoplist" was discontinued, and the "Missionary Herald" was issued by the board in its stead, he took charge of the latter periodical. He was chosen corresponding secretary of the board in 1821, retaining that office until his death. He wrote 24 essays on the rights of the Indians, under the signature of "William Penn," which were published in 1829.—See "Memoirs of Jeremiah Evarts," by E. C. Tracy (8vo., Boston, 1845).

EVE, the name given by Adam to his wife. It is derived from a word that signifies life, and was applied to her as "the mother of all living." She was created to be a help meet for Adam, and was placed by God with him in Eden; but yielding to the temptation of the serpent, and tasting and leading Adam to taste the forbidden fruit, was with him driven forth from paradise, and was doomed to many sorrows and sufferings, especially in the birth of her offspring.

EVECTION (Lat. *evectio*, a carrying out), the principal perturbation of the moon in longitudes, causing her to be alternately nearly 3 times her own breadth in advance of, and behind, her mean place. The fact of evection was discovered by Ptolemy, but its cause was unknown before the law of gravitation was discovered. It arises from the disturbing influence of the sun, alternately elongating the moon's orbit, or reducing its eccentricity, according as the end or side of the orbit is toward the sun.

EVELYN, John, an English author, born in Wotton, Surrey, Oct. 31, 1620, died Feb. 27, 1706. He was educated at Baliol college, Oxford, and then began to study law in the Middle Temple. He served for a short time in 1641 as a volunteer in the Netherlands, returned to England as the civil war was breaking out, and joined the royal army, but after the king's retreat to Gloucester left England to travel through France and Italy. He returned to England in 1651, assisted in the restoration of 1660, and was received with favor at the court of Charles II. He was one of the founders of the royal society in 1662, and a member of the first council. Upon the breaking out of the Dutch war two years later, he was named one of the commissioners to tend the sick and the wounded, and attended to his charge during all the raging of the plague. In 1664 the English naval commissioners dreaded a scarcity of naval timber in the country, and at the request of the royal society Evelyn wrote his "Sylva, or a Discourse on Forest Trees, and the Propagation of Timber in his Majesty's Dominions," a work which induced many landholders to plant an immense number of young oak trees, which furnished the ship yards of the next century. He published several other popular works on learned subjects, on painting, sculpture, architecture, and medals, and was one of the first in England to treat gardening and planting scientifically. The most valuable of his works is a diary, in which, during the greater part of his life, he related the events in which he was interested. This was published in 1818, and contains a large variety of curious and minute information concerning the manners and society of the last half of the 17th century. An enlarged edition has recently been issued in London by John Forster (4 vols. 1859).

EVERDINGEN, Aldert van, a Dutch landscape painter, born in Alkmaar in 1621, died there in 1675. He excelled in painting wild and rugged scenery. Having been shipwrecked on the coast of Norway during a voyage to the Baltic, he employed the time while the vessel was repairing in making sketches of rocks, waterfalls, and other prominent features of a mountainous country. His sea pieces, particularly those in which storms are represented, are very effective, being painted with a broad, free pencil, and carefully colored. He also excelled as an etcher, and executed upward of 100

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prints of Norwegian scenery, beside a series of 56 illustrations to the fable of "Reynard the Fox."

EVERETT, Alexander Hill, an American diplomatist and man of letters, born in Boston, March 19, 1792, died in Canton, China, May 29, 1847. His father, the Rev. Oliver Everett, was settled over a church in Boston from the time of his entering upon the ministry till 1792, when in consequence of declining health he gave up his charge, and retired to the neighboring town of Dorchester, where the remainder of his life was passed. His son entered Harvard college in 1802, and was graduated in 1806 with the highest honors of his class, although he was the youngest of its members. After leaving college he passed a year as assistant teacher in Phillips academy in Exeter, N. H. Then removing to Boston, he began the study of the law in the office of John Quincy Adams, and became a member of a literary club by which a periodical called the "Monthly Anthology" was conducted. When Mr. Adams went as minister plenipotentiary to Russia in 1809, Mr. Everett accompanied him, and resided 2 years in his family, attached to the legation. He passed the winter of 1811–'12 in England, made a short visit to Paris in the spring of 1812, and came home in the summer of that year. Upon his return he commenced the practice of the law in Boston. His profession, however, occupied an inferior place in his affections to both literature and politics. He contributed articles to some of the periodicals of the day, and wrote for one of the Boston journals a series of political papers, in which, in opposition to the dominant public sentiment around him, he sustained the policy of the administration in the war with Great Britain. A discourse pronounced by him before the Phi Beta Kappa society of Harvard college, in which he called in question the justice of some of Burke's strictures upon the French revolution, attracted some attention and comment. At the close of the war, when Mr. Eustis of Massachusetts was appointed minister to the Netherlands, Mr. Everett accompanied him as secretary of legation; but after a year or two of service he returned to the United States. On the retirement of Mr. Eustis he was appointed his successor, with the rank of *chargé d'affaires*. He continued in this post from 1818 to 1824. His official duties were not onerous, and his leisure hours were given to the preparation of a work which was published in 1821, in London and Boston, under the title of "Europe, or a General Survey of the Political Situation of the Principal Powers, with Conjectures on their Future Prospects." This work attracted much attention, and earned for its author considerable reputation, both at home and abroad. Some of the English critics were unwilling to believe that an essay written in such excellent English could have proceeded from the pen of a foreigner. It was translated into German by Prof. Jacobi, of the university of Halle, and subsequently into French and Spanish. In one of the chapters of this work he recommends a total abstinence from the seizure of private property at sea as the only just and consistent plan of maritime warfare; a practical result to which the world is a good deal nearer now than it was when Mr. Everett suggested it. In 1822 he published at London and Boston a work entitled "New Ideas on Population, with Remarks on the Theories of Godwin and Malthus," in which he controverts the well known views of Malthus on population, and contends that increase of population leads to a relative abundance, and not a relative scarcity, of the means of subsistence. When the work was ready, Mr. Everett visited London for the purpose of carrying it through the press, and while there he saw and conversed with Mr. Malthus upon the subject of the difference between them. Their discussions were courteous, inspiring each party with respect for the other, but leaving each only more fully confirmed in his own views. During his residence in the Netherlands Mr. Everett was a frequent contributor to the "North American Review," mostly upon subjects drawn from French literature. In 1824 he returned to the United States, on leave of absence, and passed the following winter at home. In 1825 he was appointed by Mr. Adams, then recently elected president, minister plenipotentiary to Spain, and remained in that post till 1829. At that time the independence of the revolted Spanish colonies in America had been recognized by the United States, but not by Spain, or by any of the European states. Mr. Everett, as the representative of the only government that had acknowledged the independence of the South American republics, became the medium of communication between them and their mother country, and in some sort their virtual representative. This imposed upon him a great amount of additional labor, and often threw him into positions requiring much tact and discretion. On one occasion, when a Colombian privateer, among the crew of which were several American citizens, had been wrecked upon the coast of Spain, and the crew seized by the government, Mr. Everett, through his personal influence with the king, procured the release of the Americans, and caused them to be sent home. Though the duties of his post were arduous, and required habits of regular industry for the successful discharge of them, Mr. Everett did not, while in Madrid, neglect the claims of literature. Beside several papers contributed to the "North American Review," he wrote a work entitled "America, or a General Survey of the Political Situation of the Principal Powers of the Western Continent, with Conjectures on their Future Prospects" (Philadelphia, 1827; London, 1828). This was intended as a complement to his former publication on Europe, and to trace the further growth and development of the political ideas which had taken shape upon the fall of Napoleon. The elevation of England into the rank of a first-rate power, the comparative decline of Austria, Spain, and France, the recent appearance of two commanding nations,

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Russia and the United States, and some speculations upon the history and prospects of the South American republics, formed the leading topics of discussion in this work, which, like its predecessor, was translated into the German, French, and Spanish languages. He was always ready to employ his official influence in aiding the literary researches of others. He invited Mr. Irving to Madrid, made him an *attaché* to his legation, and encouraged him in those studies in Spanish history and biography which subsequently bore such rich fruit. He also aided Mr. Prescott in procuring materials for the history of Ferdinand and Isabella, a service acknowledged by that distinguished historian in his preface to that work. In the autumn of 1829 he returned home, and assumed the charge of the "North American Review" as editor and proprietor. For about 5 years he conducted this periodical with marked ability. The subjects which he discussed ranged over a wide field, embracing politics, political economy, metaphysics, and literature. He defended in several elaborate papers the policy of the friends of the American system, so called, by which domestic manufactures were to be stimulated by duties upon foreign imports. Some articles, in which he reviewed the course and policy of the federal and democratic parties from a historical point of observation, are among the ablest of the productions of his pen. He was chosen to the senate of Massachusetts in 1830, and continued a member of that or the other branch of the legislature for the ensuing 5 years. He took an active and controlling part in the proceedings of each legislature of which he was a member. In 1833 he attended the tariff convention held at New York, and as chairman of a committee of that body, prepared the memorial which was presented in their name to congress at its next session. This is a very able exposition of the policy of the friends of a protective tariff. He had thus far been a member of the whig or national republican party, and had drafted the address reported by the convention which in 1831 nominated Mr. Clay for the presidency; but during the 2d term of Gen. Jackson's presidency, and after the proclamation against nullification, he became an adherent of the national administration; putting himself again, as he had done in early manhood, in opposition to the controlling public sentiment around him. In 1836, being a resident of Roxbury, he was nominated by the democratic party for congress, and again in 1838 and 1840; but in each of the contests he was unsuccessful. In 1840 he was despatched by the government upon a confidential mission to the island of Cuba, and passed 2 months at Havana, in the discharge of the duty intrusted to him. In the autumn of the same year he went again to Havana upon private business, and while there he received a letter from the governor of Louisiana, requesting him, in the name of the board of directors of Jefferson college in that state, to assume the presidency of that institution. After some deliberation he accepted the proposal, and entered upon the duties of the office in June, 1841. His declining health compelled him, after a short period, to resign his trust, and return to the north. His literary activity always continued undiminished. He was an occasional contributor to the "Democratic Review," to the "Boston Quarterly Review," and the "Boston Miscellany," a periodical edited by one of his nephews. A duodecimo volume of selections from his critical and miscellaneous essays was published in Boston in 1845, and a 2d series appeared in 1847. A small volume of poems, original and translated, was published by him in New York in 1845. In the same year he received from President Polk the appointment of commissioner to China, and set out for his post in the month of July; but on arriving at Rio de Janeiro his infirm health compelled him to return home. He sailed a second time in 1846, and arrived safely in Canton. His various cultivation, his acquaintance with oriental literature, his knowledge of European politics and society, and his fine habits of observation, enabled him to turn to the best account the advantages of his position; and had not a disease of long standing soon put an end to his life, he would undoubtedly have enriched the literature of his country with contributions equal in value, and superior in popular interest, to any of the former productions of his pen. Beside the writings which we have above enumerated, Mr. Everett contributed a life of Joseph Warren to the first series of Sparks's "American Biography," and of Patrick Henry to the second. In Oct. 1816, he married Lucretia, daughter of Judge Oliver Peabody, of Exeter, a lady who survives him. Mr. Everett was one of the most accomplished men that the United States has ever given birth to. His mind was not marked by originality and creative power, but was characterized by comprehensiveness and breadth, an uncommon power both of analysis and generalization, luminous method, accurate discrimination, and clear statement. It was philosophical in its structure and training, and he never appeared to greater advantage than when applying the essential principles of politics and government to existing systems, and pointing out how far they conformed to, and how far they fell short of, an ideal standard. His occasional essays on psychological subjects showed a metaphysical faculty of no mean order. In his purely literary essays he succeeded better in solid research and careful statement than in the treatment of airy and sportive themes. There was a want of lightness and ease in the movements of his mind, of which he was himself, apparently, not always fully aware. His industry was great, and his powers of acquisition were equally so, and thus his attainments were very large and various. As a public man, he was a vigorous debater and a judicious counsellor; but he was not remarkable for that nameless and indefinable personal influence over others which secures to some men a power over their contemporaries quite

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inexplicable to those who come after them, and judge of them by the monuments which they have left behind. The value of his pen and speech was acknowledged by his political associates; but inferior men had a larger share in the direction and discipline of the party. As a public speaker he was always heard with attention and respect; his matter was sure to be weighty, good, and carefully prepared; his face was dignified, intellectual, and expressive, and lighted up with fine dark eyes; but his voice was not very flexible, and his temperament was not sufficiently ardent to secure for him, without visible effort, the animation which the popular taste demands. His private life was without a stain. He was fond of society, and always able and willing to draw liberally upon the capacious stores of his memory for the instruction and entertainment of the social circle.

EVERETT, Edward, an American statesman, orator, and man of letters, a younger brother of the preceding, born in Dorchester, Mass., April 11, 1794. He entered Harvard college in 1807, at the early age of 13, and was graduated in course in 1811, with the highest honors, in a class containing more than an average amount of ability. While an undergraduate, he was the principal conductor of a magazine published by the students, called the "Harvard Lyceum." He left behind him at the college a very brilliant reputation as a scholar and writer, which long lingered there in tradition. For some time after leaving college, he was employed there as a tutor, at the same time pursuing his studies in divinity, the profession which he had selected. In 1812 he delivered a spirited poem before the Phi Beta Kappa society on American poets. In 1813 he was settled as pastor over the Brattle street church in Boston, filling the place left vacant by the death of the lamented Buckminster. He immediately won great admiration by the eloquence and power of his pulpit discourses. In 1814 he published a work entitled "Defence of Christianity," against the work of George Bethune English, entitled the "Grounds of Christianity Examined, by comparing the New Testament with the Old." In the same year he was chosen by the corporation of Harvard college to fill the chair of Greek literature, a professorship then recently created by the bounty of the late Samuel Eliot. With a view of qualifying himself for the duties of this post, he entered upon an extended course of European travel and study, leaving home in the spring of 1815, and returning in the autumn of 1819. After a brief stay in England, he proceeded to the university of Göttingen, where he remained for 2 years. In the winter of 1817–'18 he was at Paris. In the spring of 1818 he went over to England, where he was kindly received by many of the leading men of the day, including Scott, Byron, Jeffrey, Campbell, Mackintosh, Romilly, and Davy. He spent a day or two under Scott's hospitable roof at Abbotsford. Returning to the continent, he passed the winter in Italy, and thence made a journey into Greece, returning through Wallachia and Hungary to Vienna. During his residence in Europe, his range of study embraced the ancient classics, the modern languages, the history and principles of the civil and public law as then professed in the German universities, and a comprehensive examination of the existing political system of Europe. Upon his return home, he entered upon the duties of his professorship. He gave a new impulse to the study of classical literature by a series of brilliant lectures upon Greek literature and ancient art, first delivered to the students at Cambridge, and afterward repeated before large audiences in Boston. At the same time he took the editorship of the "North American Review," which he conducted till 1824. His object in assuming the charge of this periodical was to imbue it with a thoroughly national spirit; and in pursuance of it, he contributed a series of articles in which this country was defended with great spirit against the shallow and flippant attacks of several foreign travellers. He also found time to prepare and publish a translation of Buttman's Greek Grammar. In 1824 he made his first essay in that department of demonstrative oratory, which he has since cultivated with such signal success, by the delivery of a discourse before the Phi Beta Kappa society on the "Circumstances favorable to the Progress of Literature in America." An immense audience came to hear him, attracted partly by his own fame, and partly by the wish to behold Lafayette, who was present at the orator's side. He was heard with the greatest enthusiasm and delight. Our own recollections confirm the strong statements of a writer in the "Christian Examiner" for Nov. 1850: "The sympathies of his audience went with him in a rushing stream, as he painted, in glowing hues, the political, social, and literary future of our country. They drank with thirsty ears his rapid generalizations and his sparkling rhetoric. The whole assembly put on one countenance of admiration and assent. As with skilful and flying hand the orator ran over the chords of national pride and patriotic feeling, every bosom throbbed in unison to his touch; and when the fervid declamation of the concluding paragraph was terminated by the simple pathos of the personal address to Lafayette, his hearers were left in a state of emotion far too deep for tumultuous applause." This was the first of a series of discourses pronounced by Mr. Everett on public occasions between that time and the present, embracing every variety of topic connected with our national history, character, and prospects, and which combine in an eminent degree the peculiar charm of popular oratory, with those substantial merits of thought and style which bear the cold criticism of the closet. Mr. Everett's public life began in 1824, when he was nominated and elected to congress by the constituency of the district in which he resided. His nomination was made without his being consulted, and was a spontaneous movement on the part of the young men of his district, almost

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without distinction of party. He was himself, as might naturally be expected, a supporter of the administration of Mr. Adams, then just elected president. Mr. Everett served, by successive reëlections, 10 years in congress; and during the whole period he was a member of the committee of foreign affairs, perhaps the most important one at that time in the house. In the 20th congress, though generally acting with the minority, he was chairman of that committee, having been selected for that post by the democratic speaker, Mr. Stevenson of Virginia. He also held a place on all the most important select committees raised while he was in congress, and in every instance he was selected to draw either the majority or minority report. In the 19th congress, though then just elected to the house, and the youngest member of the committee of foreign affairs, he drew the celebrated report on the Panama mission, the leading measure of that session. In the 20th congress, forming with Mr. John Sergeant of Philadelphia the minority of the well-known retrenchment committee, he drew up all those portions of its report which relate to the departments of state and of war. He was chairman of the select committee, during Mr. Adams's presidency, on the Georgia controversy, and was always zealous and prominent in his efforts to secure good treatment to the Indians. He drew the report for the committee in favor of the heirs of Fulton. With Gov. Ellsworth of Connecticut he formed the minority of the bank investigating committee which was sent to Philadelphia in 1834, and drew up the minority report. He wrote the minority report of the committee of foreign relations upon the controversy with France in the spring of 1835, and took a leading part in the debate upon the subject. He made two or three reports on the subject of the claims of American citizens on foreign powers, for spoliations committed on our commerce during the French continental system, and continued the discussion further in the "North American Review." He always served on the library committee, and generally on that for public buildings. In 1827 he addressed a series of letters to Mr. Canning on the colonial trade, which were extensively read. In the summer of 1829, in the congressional vacation, he made an extensive tour through the southwestern and western states, and was everywhere received with marked distinction. At Nashville, at Lexington, and at the Yellow Springs in Ohio, he was complimented with public dinners, and charmed his hosts by beautiful specimens of that species of eloquence in which he is generally admitted to hold the first place among his contemporaries. The points of Mr. Everett's congressional career which we have indicated form but a small part of his labors and services in the house of representatives. He was a faithful and assiduous attendant of the sessions, and a diligent observer of the proceedings of that body. He was a frequent but not an obtrusive debater. His speeches were carefully prepared, full of information, weighty in substance, polished in form, and perfectly free from those indecorums and personalities which sometimes deface congressional debates. In his attention to the private affairs of his constituents he was always prompt and patient. Occupied as he was with public business during his congressional life, his regular and inflexible habits of industry enabled him to find time for literary labor. Beside the elaborate public addresses which he occasionally delivered, he prepared several articles of high merit for the "North American Review." Among them may be mentioned with particular commendation a paper in the number for Oct. 1830, in which the South Carolina doctrine of nullification is discussed and controverted with masterly ability. To this article Mr. Madison's letter on the subject, addressed to Mr. Everett, was with the author's permission appended. In the autumn of 1834 he declined a renomination to congress, as his political friends in Massachusetts were desirous of presenting his name as candidate for the office of governor, to which he was chosen by a large majority in the ensuing election. He was afterward 3 times reëlected, holding the executive office 4 years. His administration was dignified, useful, and popular. Among the measures which marked the period of his official service were the subscription of the state to the stock of the Western railroad, the organization of the board of education and the establishment of normal schools, the scientific and agricultural surveys of the state, and the establishment of a commission for the revision of the criminal law. In the discharge of what may be called the ceremonial duties of his station, Gov. Everett was eminently happy. His manner in presiding was dignified, graceful, and courteous. To the natural desire of his constituents to hear him speak he responded with the most good-natured readiness, and the many occasional speeches he delivered were uniformly spirited and happy. In the autumn of 1839, after an animated struggle, he was defeated by Marcus Morton by a majority of one vote. Relieved from public duty, he was led by the state of his own health and that of his family to visit Europe a second time. He sailed with his family in June, 1840. They passed the summer in France, and the following winter in Italy, most of it in Florence and its neighborhood. He intended to pass another winter in Italy, but the course of political events at home interfered with his purpose, and sent him upon a new path of public duty. Gen. Harrison was chosen president in 1840, and Mr. Webster, the secretary of state, Mr. Everett's warm personal and political friend, perceived his eminent fitness to represent the country at the court of St. James, and to this post he was accordingly appointed. Our relations with England at that time were grave. The controversy touching the north-eastern boundary, which for half a century had been a subject of difference,

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seemed to have reached a point beyond which an amicable adjustment was hopeless. The recent burning of the Caroline, and the arrest of McLeod, had inflamed the public mind in both countries. The case of the Creole, and questions connected with Oregon and Texas, were also elements of irritation. American vessels had been seized and detained by British cruisers on the coast of Africa. The confidence reposed in him by the administration at home was shown by the fact that he was sent to London to discuss all these questions without any specific instructions from the government of the United States, but every thing was left to his own unfettered judgment. Entering at once upon the discharge of his arduous and delicate duties, he justified by his ability, discretion, and tact, the large confidence which had been reposed in him. Though the settlement of the north-eastern boundary, and of the Oregon question, was transferred to Washington by the appointment of Lord Ashburton as special ambassador, yet many important questions were left in Mr. Everett's charge. Among the most important was that involving the construction of the first article of the convention between the two countries on the subject of the fisheries. Mr. Everett secured for our fishermen the long disputed right to take fish in the bay of Fundy. He procured at various times, and in the face of great obstacles, the release from the penal colony of Van Diemen's Land of 60 or 70 American citizens convicted of participation in the Canadian rebellion. Mr. Everett's position at the court of St. James must have been rendered more difficult by the frequent changes in the department of state. Mr. Webster retired in the spring of 1843, and was succeeded within a brief period by Mr. Upshur, Mr. Legaré, and Mr. Calhoun. But by all these gentlemen Mr. Everett's services were duly appreciated, and he enjoyed the confidence of all. Mr. Everett's social position in England was equally honorable and agreeable to him, and a source of just pride to his countrymen. His cultivation and accomplishments were everywhere recognized, and his public speeches were received with enthusiasm. In the spring of 1843 he was appointed to fill the newly constituted mission to China, with a view to establish commercial relations with that country, which honorable trust he was compelled to decline. Immediately upon his return to the United States in the autumn of 1845, Mr. Everett was chosen president of Harvard university. He entered upon the duties of this new trust with characteristic energy and enthusiasm, and it was a subject of great regret to the friends of the college that the burdensome details and monotonous confinement of his official life wore so heavily upon his health as to compel him to resign his post at the end of 3 years, before he had been able to carry into effect his important plans for educational improvement. Mr. Everett gave a portion of his leisure, after resigning the presidency, to the preparation of a collected edition of his orations and speeches, which appeared in 2 vols. 8vo. in 1850. He also superintended the publication of the new edition of the works of Mr. Webster, at his special request, and prepared an elaborate memoir, which was prefixed to the first volume. Upon the lamented death of that great statesman, in Nov. 1852, Mr. Everett was called upon by President Fillmore to fill the vacant place of secretary of state. He held the office during the last 4 months of President Fillmore's administration, and the condition of the public business made them months of most severe labor; and nothing but his indefatigable industry and great patience could have carried him through what he was called upon to do. Beside paying the most conscientious attention to the regular business of the department, always heavy, and in this case greatly accumulated, he adjusted the perplexing affairs of the Crescent City steamer and the Lobos islands, prosecuted with energy the difficult negotiations pertaining to the fisheries, concluded an international copyright convention with Great Britain and a consular convention with France, and reviewed the whole subject of Central American affairs in their relations to the government of the United States and Great Britain, and recommended and induced congress to establish a mission of the first class to Central America. But the question which attracted most of the public interest during Mr. Everett's administration of the department of state was the joint proposition of Great Britain and France to enter with the United States into a tripartite convention, guaranteeing to Spain in perpetuity the exclusive possession of Cuba. This proposition was declined by the United States, in a diplomatic note of great ability drawn up by Mr. Everett. His exposition of the policy of this country was received with very general approbation by the people and the press, without distinction of party. Notwithstanding his arduous official duties, he found time to prepare an elaborate address for the annual meeting of the American colonization society in Washington, in 1853, in exposition and defence of the objects of that association. Before leaving the department of state Mr. Everett was elected by the legislature of Massachusetts to the senate of the United States, took his seat in that body at the commencement of the special executive session in March, 1853, and made an able and elaborate speech on the Central American question. In the summer and autumn of 1853, beside an address before the New York historical society on colonization and emigration, and a reply to the protest of Lord John Russell against the doctrines asserted by our government in the note declining the tripartite convention, Mr. Everett spoke more than once in opposition to the proposed new constitution in Massachusetts. Upon the assembling of the 33d congress, in Dec., 1853, Mr. Everett, as might have been expected, found himself in a state of impaired health from the severe and uninterrupted labors of the previous 18 months, but he applied himself with

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his usual industry to the discharge of the duties that lay before him. Had the session proved one of no more than average labor and excitement, perhaps his strength would have enabled him to meet the duties of his post; but such was not the character of the session. The introduction of the bill for the repeal of the Missouri compromise, commonly called the Nebraska-Kansas bill, produced great agitation throughout the country, and brought the opposing parties in the senate into violent and protracted antagonism. For many weeks the sessions were long continued, and the discussions of the most vehement and impassioned character. Mr. Everett delivered a speech against the bill, on Feb. 8, 1854, characterized by his usual moderate and conservative views, as well as by good taste and good temper. His health, under the pressure of official toil and excitement, grew constantly worse, and in the following May, under the imperative advice of his physician, he resigned his seat. A few months of rest and quiet restored him; and now there began a new phase in his life, and the opening of a new and peculiar sphere of action. In the year 1853 the project of purchasing Mount Vernon by private subscription was first started by Miss Ann Pamela Cunningham, in an address to the women of the United States, under the signature of "A Southern Matron." The proposal was favorably received, and associations of ladies began to be formed in several of the states, for the purpose of collecting funds. Mr. Everett, having been applied to by the mercantile library association of Boston to deliver a lectnre during their course of 1855–'56, proposed that the association should celebrate the next anniversary of the birthday of Washington, and offered to prepare for that occasion a discourse upon his character, the proceeds to be applied to some commemorative purpose. The offer was accepted; and on Feb. 22, 1856, Mr. Everett pronounced his oration on Washington, for the first time, before an immense audience at the music hall in Boston. It was immediately repeated at New York, New Haven, and Baltimore; and the proceeds were applied to various objects. It was delivered for the first time for the benefit of the Mount Vernon fund at Richmond, Va., on March 19, 1856; and down to the present time (June, 1859) it has been delivered in various parts of the country 129 times, always, except in 7 cases, for the benefit of the Mount Vernon fund. No deductiou has ever been made by Mr. Everett from the amounts received on account of his expenses, which have been uniformly paid by himself; they have been much reduced by the hospitality with which he has been received, and the liberality of railroad corporations and the proprietors of steamboats. The proceeds received were deposited by him in the hands of a board of trustees appointed by himself. They have paid over to the general treasurer of the fund at different times the sum of $53,393 81, and have now on hand the further sum of $4,769 75. In the course of the autumn of 1858 Mr. Everett entered into an engagement with Mr. Robert Bonner, editor and proprietor of the "New York Ledger," to furnish an article weekly for that paper for one year in consideration of $10,000 to be paid in advance to the Mount Vernon fund. This sum has been paid to the treasurer of the fund. In the first of these articles, Mr. Everett invited the readers of the "Ledger" to transmit each the sum of 50 cents or more toward the increase of the Mount Vernon fund. Many persons have responded to this call, and the net amount received from this source is $2,929 94, which is included in the sum of $53,393 81 mentioned above as having been paid over to the general treasurer. Nor have Mr. Everett's labors and journeyings been limited to the augmentation of the Mount Vernon fund. On Dec. 22, 1857, he delivered at Boston an address on charity and charitable associations for the benefit of the Boston provident association, which has since been repeated in different parts of the country 15 times, with an aggregate net receipt, for the benefit of various charitable associations, of about $13,500. On Jan. 17, 1859, he delivered an address at Boston on the "Early Days of Franklin," at the invitation of the association of the Franklin medalists of that city, which has since been repeated 5 times, yielding about $4,000, for the benefit of various charitable and public associations. On Dec. 7, 1858, he pronounced a eulogy on Mr. Thomas Dowse, before the Dowse institute, at Cambridge, Mass., which was afterward repeated before the Massachusetts historical society, yielding to the two institutions about $1,500. The aggregate sum total realized in the various ways above mentioned, and paid over to the Mount Vernon fund and sundry public or charitable associations, including the proceeds of the 7 repetitions of the Washington discourse which were not for the benefit of the fund, will not fall short of $90,000. We have gone somewhat into detail in our sketch of this part of Mr. Everett's life, not merely on account of its peculiar and interesting character, but because we think the facts we have mentioned are entitled to record as illustrating the genius of our people, and the relations which our political institutions have established between the general community and those men who from their abilities, attainments, and accomplishments, are the natural leaders of public sentiment. It would not fall within the plan of this work to give any elaborate analysis of the mental qualities or personal traits of a man who is still living and in the prime of his powers; and the wide reputation he enjoys, and the opportunity which so many of his contemporaries have had of listening to his eloquence, render this a superfluous task. It may not, however, be unbecoming to hold him up for commendation and imitation, to the young men of the country especially, for his indefatigable industry and his methodical habits of labor, and as an example in disproof of the common notion that such habits are not compatible with the most brilliant natural powers.

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EVIDENCE. Judicial evidence, which is the subject of this article, differs from the proofs by which human judgment is ordinarily determined in non-judicial matters, chiefly in certain rules established for the sake of facility in disposing of complicated questions of fact, or of public policy when by lapse of time or other causes there would be a deficiency of evidence. These rules may be conveniently reduced under the following heads: 1, cases in which a rule is prescribed for the purpose of getting at a certain conclusion, though arbitrary, when the subject is intrinsically liable to doubt from the remoteness, discrepancy, or actual defect of proofs; 2, cases in which evidence is excluded on the ground of being untrustworthy and tending to unnecessary prolixity, or from its very nature likely to be untrue; 3, cases in which a legal presumption is substituted for actual proof, or in place of what could be proved, being supposed to be more consistent with the real rights of the parties than any result which could be expected from positive testimony; 4, the graduation of the weight of evidence, which will be found in some instances to be arbitrary in its origin, and perhaps not altogether in accordance with the ordinary process of judgment.—Under the 1st class will be included various rules which have been adopted, not from any exact uniformity *per se*, but for the sake of having some rule of general application, among which may be specified the following: *a*. That after 7 years' absence without having been heard from, a man shall be presumed to be dead. It is obvious in this case that the period fixed upon is no more certain than any other, but it was necessary for the protection of the rights of parties who were compelled to act upon some presumption, that a legal rule should be established. If a man therefore has been absent 7 years without any thing being heard of him, his wife may marry again without incurring a penalty for bigamy, though it has not been provided that the 2d marriage shall be absolutely valid in case the husband should afterward return; and his heir, or the person entitled to his estate by succession, becomes vested with the legal ownership, the same as if his decease was actually proved. *b*. That after the exclusive possession of land or of an incorporeal hereditament for a certain period of time, a grant shall be presumed, and the title of the occupant will be sustained against all claimants. In England this period was formerly expressed with some vagueness, as being beyond the memory of man, and the rule applied there only to incorporeal estates; but by a recent statute (2 and 3 William IV.) the period has been limited to 20 years in cases of aquatic rights, ways, and other easements, and to 30 years in respect to right of common and other uses arising out of lands, except tithes and rents. In the United States the presumption is generally the same both in respect to corporeal and incorporeal estates. In the state of New York 20 years' exclusive, undisturbed possession is sufficient to establish title to lands or easements; it being understood, however, that this possession has been under claim of right. But it is provided that no one shall be entitled to recover against the occupant unless he or those from whom he claims have had possession within 20 years. *c*. That deeds more than 30 years old may be used as evidence without proof of their execution; in other words, that they prove themselves. The presumption in such cases is that the subscribing witnesses by whom proof of execution is ordinarily made are dead, but the rule is the same even if such witnesses are actually living. In offering such a deed in evidence, it is only necessary to give some account of the custody of it, so as to rebut any suspicion in respect to its genuineness. *d*. An infant under the age of 7 years is conclusively presumed to be without discretion. Beyond that age it will be a subject of proof whether he is *doli capax*, but prior to that time no inquiry is permitted. So an infant under the age of 14 is presumed incapable of committing a rape, though in fact there are instances of sexual capacity before that age. So when husband and wife are living together and impotency is not proved, the issue will be presumed legitimate, although it should be proved that the wife has during that time committed adultery. *e*. By the common law, if a wife do any act in the presence of her husband amounting to felony, other than treason or murder, she is presumed to have been under coercion, and therefore not criminally liable. This rule, however, having as is supposed grown out of the arbitrary privilege known as benefit of clergy, is not admitted in the United States, but proof must be made of actual coercion; slight proof is in general however sufficient.—The 2d class of cases includes two rules which were formerly of very frequent application. *a*. What is called hearsay is inadmissible. By this is meant that a witness should not be permitted to testify what he has heard another person say, but only what he knows himself. To this rule there are some qualifications rather than exceptions. Thus it is sometimes proper to prove what was said by a person at the time of performing a certain act, as having some tendency to explain the intent, and therefore admissible as a part of the *res gestæ*, according to legal phraseology. In such a case, however, what was said does not strictly come under the designation of hearsay, but is itself a principal fact. So also it is admissible to prove what has been said by a party to an action. This again is a principal fact, or at all events comes under the designation of declarations or admissions, and as such is admissible. So it is permitted in cases of homicide to prove dying declarations, that is, what was said by the murdered person shortly before and in expectation of death. This is not unusual in trials for murder, and is competent evidence, both to show the manner of the death and who was the murderer. The testimony of a witness on a former trial may also be proved on a second trial, in case of his decease prior thereto. Again, witnesses are allowed to testify

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to matters of tradition in respect to old boundaries of estates. The rule in England is limited to cases in which some public right is involved, as when a right of common is in question; but in the United States it has been allowed in many cases where the lines of large tracts of land became material in determining the limits of smaller estates. The traditional evidence, as it is called in such cases, consists of proof of what has been said long since by persons who may be supposed to have had some personal knowledge, or to have heard from others who had such knowledge. Pedigree, including the facts relating to birth, marriage, and death, may also be shown by proof of what has been said by members of the family or relatives of the person whose parentage or relationship is in question. Many other illustrations could be cited, but these will suffice. It should be remarked that upon the same principle by which the kind of evidence last referred to is admissible, other modes of proof, which are ordinarily classed under hearsay, though they in fact belong to that species of evidence in no other sense than as above explained in respect to oral testimony, are admitted, such as a family register, inscriptions on monuments, and the like. But with the exceptions, if they may be so called, which we have specified, hearsay evidence is wholly and absolutely excluded by the English law. The reason usually given for this exclusion is hardly satisfactory. That hearsay is an imperfect kind of evidence is certainly true, and also that in many cases, but not in all, better evidence can be procured; as if the person is living whose declarations it is proposed to prove, and could himself be called as a witness, in which case another principle would apply, viz.: that a party should produce the best evidence which he has the power to obtain. But in some cases it is the best which the party can procure, and yet it is excluded. And again, although not of a high order, it is not in any case entirely without weight, and should therefore be admissible subject to proper allowance as to the degree of credit to be given to it, unless it should be excluded on the ground of greater disadvantage by the prolixity which it would involve, than there would be of benefit to either party by its admission. This last consideration might be sufficient often to shut out evidence as not being of importance enough to warrant the consumption of time that it would require; but it can scarcely be maintained that all evidence of this class is wholly immaterial, and therefore *per se* unworthy of attention. *b.* Another rule relates to the competency of witnesses, and it has been more prolific of subtle distinctions and perplexing questions than any other rule in the law of evidence. A chief ground of exclusion was formerly interest in the subject of the action. The theory was that there is an inevitable tendency to suppress or pervert the facts, under the influence of a supposed interest in the result. This of course constituted a proper exception so far as respects credibility; but instead of receiving the testimony subject to a proper discrimination as to its effect, courts relieved themselves of all embarrassment in determining its relative weight, by wholly excluding the testimony of an interested witness. Under this rule not only the parties to the action, but all persons having an interest in the result, were, as a general rule, adjudged incompetent to testify. In determining, however, the nature of the interest which should constitute a disqualification, it was found exceedingly difficult to fix precise rules of general application, and much confliction was involved in the decisions. Finally it was settled that the interest must be a direct gain or loss by the operation of the judgment in the action, or that the record would be evidence for or against the witness in some other action. This, however, left a variety of difficult questions as to what would be the actual effect of the judgment as respects the witness. Some exceptions also to the rule itself were by necessity admitted. Thus carriers, brokers, and other agents were held competent to prove the receipt or delivery of goods and other acts done in the course of their employment, although they have a direct interest in showing the performance of their duty; and yet, as if to prove the absence of all general principles in reasoning upon the subject of the admissibility of evidence, an agent or servant was excluded from testifying in a suit against the principal founded upon the alleged misconduct of the agent. The inconsistency is that the judgment in the action against the principal would not be evidence of any such misconduct in a subsequent action against the agent, and the interest of the witness in the case supposed is no greater than in the ordinary cases where agents are admitted to testify as to their own acts. Again, a bailor, though a plaintiff in the suit, has always been permitted to show the contents of a trunk, box, or package, which has been lost or embezzled by the bailee—the delivery of the trunk, &c., being proved by other testimony. But it is unnecessary to pursue the subject of the competency of witnesses further. The conviction at length became general that the exclusion of witnesses on account of interest worked injuriously, and accordingly, both in England and the United States, the system has been virtually abrogated. By statute 3 and 4 William IV., c. 42, it was provided that no person offered as a witness should be excluded on the ground that the verdict or judgment in the action could be used for or against him. The act 6 and 7 Victoria, c. 85 (1843), provided that no one except a party, or the husband or wife of a party, should be excluded from testifying on the ground of interest in the subject of the action or event of the trial. The act 14 and 15 Victoria, c. 99 (1851), enacted that parties and persons on whose behalf a suit is brought or defended shall be competent and compellable to testify as witnesses for either party, except that in criminal proceedings for an indictable offence neither the party charged nor the husband or wife of such

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party could be a witness; and except also that the provision should not apply to actions founded upon adultery, or for a breach of promise of marriage. By a subsequent act, 16 and 17 Victoria, c. 83 (1853), the husband or wife of a party in a civil action was made competent as a witness except in cases of adultery, but with the qualification that such witness should not be bound to disclose any confidential communication made by either to the other during marriage. In the state of New York similar provisions have been adopted by the code of 1849, which abolished the objection to witnesses on the ground of interest; and by an amendment in 1857 which authorized parties to testify in their own behalf in civil suits the same as other witnesses, except when the adverse party is an assignee or legal representative of a deceased person. One disability, however, was left, viz., as respects husband and wife, neither of whom can testify for or against the other except in a prosecution for injuries committed by one against the other. So far as this disability rests upon any supposed bias derived from personal interest, it is inconsistent with the statutory change in the law of evidence above referred to. Another reason given for the common law rule of exclusion seems equally untenable, viz., that the wife is presumed in law to be under a sort of duress, by reason of which she was formerly not criminally chargeable for felony (except treason and murder) committed in presence of the husband, inasmuch as she is in the United States allowed to hold property, and to execute conveyances in respect thereto. So also the reason sometimes given, that it is the policy of the law to preserve domestic harmony (which has been carried so far that courts have refused to allow the wife to testify even with consent of the husband), if entitled to weight, should also disqualify parents and children, brothers and sisters, so long at least as they belong to the same household. In England a bill has been recently introduced into parliament, which is not yet acted upon, by which the defendant in trials for treason, felony, or misdemeanor may testify in his own behalf, and so also the husband or wife of the party charged.—The 3d of the classes into which we have divided the rules of evidence consists of presumptions of law in lieu of actual proof, or of what could be proved, under which may be specified the following: *a*. The statutes of limitation, by which a period of time is fixed when a debt shall be presumed to have been paid, or satisfaction to have been received. This sort of presumption is made, not for want of actual proof, as the period is usually short, and therefore not like the case of prescription for incorporeal rights, or title to land by adverse possession, in respect to which the time by the English law extends back far beyond the memory of living witnesses, and even the less remote time prescribed in the United States being still subject to the loss of important evidence. But the limitation of time as to personal actions for debt or injuries has in view not so much the irreparable loss of testimony, by death or otherwise, as to put an end to controversy within a reasonable period. The current business of life has enough to employ our attention without our being burdened with the memory of all former transactions. *b*. Estoppels. A man is said to be estopped when it would be inconsistent with good faith or with the policy of the law to allow him to deny a certain fact or legal conclusion. Thus, if he claims under a deed or will, he is bound by all that is contained in it, and is estopped either from denying any recital therein, or from setting up any claim of title adverse to or inconsistent with such deed or will. In order to constitute an estoppel the recital must be distinct and clear, but it is not subject to the same strictness that would be applied to extraneous proof of the same fact. Thus, if a testator says in his will that he has conveyed his lands in A to his son D, and he devises all his remaining lands to another, the conveyance referred to must be understood to be in fee, and no other proof of it is required as against any of the parties claiming under the will. On the other hand, good faith demands that the estoppel should take effect only according to the real intent of the grantor with a right understanding of the facts, and therefore proof of mistake is sometimes admitted. An *estoppel in pais*, as it is called in the old cases, is when a man is precluded by his own act or admission from proving any thing contrary thereto. An instance of this is when a man has by some statement or admission induced another with whom he was dealing to enter into a contract; he will not afterward be permitted to deny the truth of such statement or admission if the effect would be to work an injury to such third party. So a tacit admission, as when a person having a claim to land allows another to purchase it of a party who has a defective title, or to make valuable improvements, without giving such third party notice of his claim, will operate as an estoppel to his setting up his claim against such innocent purchaser; but, according to some of the cases, it can only be enforced as an equitable relief, and is not a bar to an action at law. Upon the same principle, if a person allows a promissory note or other obligation, which he has given to another, to be assigned by the holder to a *bona fide* purchaser, and neglects to apprise such purchaser of a defence which he has to it, he will not be permitted to set up such defence as against him. To this head also belongs what is called *res judicata*, that is to say, the rule that when a fact necessarily involved in an action is once determined it shall not afterward be called in question as between the same parties or persons claiming under them. A judgment or decree of a competent court is final not only as to what was actually determined, but as to every matter which was involved in the issue, and which could have been decided. The record of the judgment is the only proper evidence of what was in issue, and it cannot be proved *aliunde* that some matter was in fact involved

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and taken into consideration which does not appear by the record to have been involved in the issue. This is the rule as to decisions of tribunals in our own country. In respect to foreign judgments and decrees, the effect is the same when the court had jurisdiction of the case, and no fraud has been practised. The record itself, which must be produced, is not conclusive as to facts necessary to give jurisdiction, and a defendant will be permitted to prove that he was not personally served with process; so any fraud on the part of the court or its officers may be shown. But the regularity of the judgment having been established, it is conclusive upon all matters embraced in the issue.—The 4th class in the arrangement we have made of our subject, viz., the comparative weight of evidence, is of a twofold character. Judicial discrimination may lead to the rejection of testimony as being entitled to no weight at all, or it may determine the relative influence which it should have if admissible in the decision of a question of fact. The former we have already considered, so far as respects the incompetency of witnesses and the exclusion of hearsay testimony. But evidence is sometimes excluded for reasons of more limited application. Thus, inferior testimony is not admitted when a party has it in his power to produce what is of a higher order; as if the question be as to the title to real estate derived from a deed, the best proof will, of course, be the production of the deed itself, and no other proof will be admitted as a substitute, unless a satisfactory reason is given for its non-production, as where it has been lost or destroyed. But in this case, the substituted evidence must be exclusively as to the contents of the deed. In the United States that particular question is of rare occurrence, as conveyances of real estate are usually recorded, and the record or a certified copy may be read in evidence with the same effect as the original. So when a contract is in writing, it is necessary to produce the writing itself, and no other evidence can be given of the terms of such contract, without showing first the loss of the writing, or that for some other satisfactory reason it is impracticable to produce it; upon making which proof, parol evidence may be given as to the contents. And whenever, in the course of a trial, a fact comes in question, the evidence of which is in writing, the same rule is applied, viz., that no other evidence can be admitted than the writing itself if in existence, and if not, then only the substituted proof of its contents. It may however happen that nothing more than the purport can be shown, and not the exact phraseology; and some latitude will be allowed in such case, as by admitting proof of the acts of parties, and other circumstances, but still having in view to get at what was expressed by the writing. It does not follow, however, that when the best or what is called primary evidence cannot be produced, inferior or what is called secondary evidence will in all cases be admitted. Thus, as we have before shown, hearsay evidence is excluded, even if none better can be procured. Upon the same principle, when a writing is put in evidence, it must have effect according to its terms, and parol evidence is not admissible to give it a different construction, or to defeat its operation according to the import thereof; or even if the writing is ambiguous, it cannot be explained by other evidence, if the ambiguity be intrinsic, that is, if the phraseology is *per se* doubtful. But if the ambiguity arises from something referred to, but not fully expressed in the writing, explanation by other evidence is admissible. The latter is designated in law as a latent ambiguity, by which is meant that it does not appear upon the face of the instrument, but arises from something extrinsic. So also, when parties to a contract have undertaken to express it in writing, it will be assumed that they have expressed the whole, and nothing can be added by parol evidence, so far as relates to what the parties had in view at the time the contract was made. This is in effect saying that the written contract must speak for itself, and will be presumed to contain all that was intended at the time, though this contract may be varied by a subsequent parol agreement for good consideration. To the general rule as above stated there are, however, some qualifications. 1. It is admissible to explain the subject of the contract and all the circumstances which may properly be supposed to have been had in view by both parties, for the purpose of understanding the phraseology which they may have used. 2. Terms peculiar to a science, profession, art, or trade may be explained by witnesses conversant therewith. 3. Parol evidence is admissible to impeach a written instrument, by showing fraud, illegality of the subject matter, or whatever would operate in law to avoid it.—The admissibility of evidence is in judicial proceedings a matter of law, and in jury trials is determined by the court. But it is not alone for this purpose that discrimination is required. A question of fact usually involves testimony on both sides, which must be collated, and the relative weight of which must be determined in order to reach a correct conclusion. Usually the court arranges and sifts the evidence in the instructions given to the jury, and it is obvious that without this aid the jury would be incompetent to analyze the evidence in a complicated case. Since the disqualification to testify by reason of interest has been abolished, the reasons which formerly were insisted upon as grounds of such disqualification are still proper to be considered with reference to the credit of the witness. It would be out of place to discuss these reasons at large in a brief summary of principles to which this article is necessarily limited. A single case may however be appropriately referred to, viz., the impeachment of a witness by direct testimony of other witnesses, showing that he is unworthy of credit. This kind of testimony is peculiar. The inquiry is limited to the general reputation of the witness whose veracity is in question, and the im-

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peaching witness is not allowed to testify to particular facts. The usual course of examination is to inquire what is the general reputation of the witness as to veracity, and formerly it was permitted then to ask the impeaching witness whether he would believe the other under oath, but the authorities are in this country not altogether uniform as to the latter practice. It may not be improper here to say that the rule as to impeachment of a witness is seldom of use, except where he is notoriously destitute of principle. But in many cases it may be essential to a proper judgment of the credit to be given to a witness, to know any particular exceptions to his character, although not extending to notoriety; and therefore the opinions of witnesses on the facts of which they may be cognizant may sometimes be important, even if not generally known. The only serious objection to this mode of inquiry is the liability to involve protracted collateral issues. The impeached witness should of course have the right to rebut, and this might sometimes lead to a conflict of evidence upon matters aside from the principal issue. Still, if there be any value in testimony called in for the impeachment of the credit of a witness, the opinions of those who have had dealings with him, or the transactions themselves which constitute the ground of exception, are far more to be depended upon than general reputation, which is in fact but common rumor, and usually has an intermixture of the false with the true. The common judgment of men is that falsehood in one instance affords a strong presumption in every other case when the statement of the same person is called in question. The existing legal rule is however restricted within the narrow limit first mentioned, viz., general reputation.—We have thus briefly analyzed the general principles of the law of evidence. Our subject would however be imperfectly treated if we should not refer to some of the rules which have more particular relation to the practice of the courts. One is that the best evidence must always be produced; or in other words, that inferior evidence will not be received when a party has it in his power to produce better. But it does not follow, as before remarked, that when a party has not the power to produce the best, any other without restriction is admissible. The secondary proof must still be such as is held competent under other rules, or it will be rejected. The meaning of the rule is that inferior evidence, although otherwise competent, shall not be admitted when better can be had. We have before adverted to the distinction between writings or documentary proof, and oral, or as it is usually called, parol evidence. The distinction is founded upon the uncertainty of memory. Whatever has been put in writing can never be proved by mere recollection with perfect exactness; the writing itself is of course the most trustworthy, and according to the rule above mentioned it must be produced or its loss proved before its contents can be shown by other evidence; and this is true whether the writing relates to the principal fact or subject of the action, or is merely incidental. Again, when the question is as to a fact respecting which there is evidence in writing, but an offer is made to prove the fact by evidence *aliunde* without producing the writing or proving its contents, the rule is that if the writing was the concurrent act of both parties, as if it was signed by them or was prepared with the privity of both as an expression of their mutual understanding, it is thereby constituted the primary evidence of the fact to which it relates, and must be produced. This includes not merely a written contract which is the subject of the action, but any other writing which the parties have agreed upon as the expression of any fact incidentally involved in the action. There is this difference, however, between the two cases: that in the former no other proof can be received but the instrument itself, or if lost, proof of its contents; whereas in the latter there may be other evidence bearing upon the same point which is admissible, together with the writing, and in some instances without it, where it is not intentionally withheld. Thus a written correspondence between the parties may be material to show their understanding in respect to some transaction, but this would not preclude proof of conversations or other acts. If, however, the correspondence contains a contract, the rule would be otherwise; for then, according to another rule, no other evidence can be received except what is necessary for the proper explanation of the meaning of the parties in the language used by them. It is not material which party has possession of the writing; the rule is the same in either case. If wanted by one party, and the other has possession of it, upon notice by him to the other to produce it, and its non-production, he may give parol evidence of its contents.—It is to be understood that the rule above mentioned applies only to a writing in which both parties have concurred. When it is a memorandum by one without the privity of the other, it cannot be evidence at all, except under the recent modification of the law of evidence allowing parties to be witnesses, and is subject to the same rule that applies to any other witness. The rule as to a memorandum made by a witness at the time of the transaction referred to in it is, that he may refer to it for the purpose of refreshing his memory; but having done so, he is to testify what with this aid he is able to recollect. If, however, he has no recollection independent of the memorandum, the later doctrine is that on proving that it was made at the time of the transaction referred to, and that he then had knowledge of the subject, the memorandum itself may be put in evidence. The mode of proving a writing which is attested by a subscribing witness is peculiar. In such a case the subscribing witness must be called if living and within the jurisdiction of the court; but if dead or absent from the country, proof of his handwriting or of that of

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the party will be sufficient to make the instrument evidence. The exclusion of proof of execution, by any other person than the subscribing witness has been often the occasion of inconvenience; and the reason usually assigned for it, viz., that the subscribing witness is supposed to have some knowledge of the subject which another would not have, is certainly very singular, as if he had such knowledge he would not be allowed to testify to it, if it would at all vary the effect of the instrument. In England, by a recent act, 17 and 18 Victoria, c. 125 (1854), a subscribing witness to an instrument which is not required by law to be attested need not be called, but the instrument may be proved in the same manner as if there was no such witness. The rule that parol evidence is not admissible to contradict, vary, or explain a written instrument has been before referred to, and certain exceptions or qualifications were mentioned viz.: that evidence may be given of such contemporaneous circumstances as would be essential for the proper understanding of the expressions used by the parties; or in explanation of technical language where the transaction relates to some trade or art, and the like; or lastly, when some ambiguity arises not involved in the language and in the instrument. An instance of the last exception is a case where a devise has been made to John Jones, and it turns out that there are two persons of that name; in which case it is admissible to show by other evidence which of the two was meant. But if from the language of the instrument it should be impossible to determine the meaning even with the aid of such explanations as would be admissible under the exceptions above mentioned, the defect could not be supplied, and the instrument would be void. Probably the greater strictness in the latter case is founded upon the fact that the admission of such explanations would be substituting other language than what the party himself has used, whereas in the case of latent ambiguity the court gives effect to the language of the party, but is obliged to obviate a doubt to which his attention was not directed. The distinction is not however very satisfactory; and a forced construction has been often resorted to in order to give effect to an instrument, which for the want of explanation that might perhaps have been given, but was not allowed by law, would otherwise have been void. Thus a grant of 10 acres of woodland described only as belonging to the grantor, when he had in fact 100 acres, was held in the old books to give an election to the grantee to take which 10 he pleased; it would probably now be held to give an undivided tenth part, and a partition would be necessary. So if a deed recited that the grantor had two tenements, and granted one without specifying which, the grantee was allowed an election to take either. But this liberality of construction was capriciously exercised. Thus an obligation to J. S. describing him as son and heir of G. S. has been held good, although he was a bastard and therefore no heir. But a grant to John, son and heir of G. S., if in fact the name of the heir was Thomas, was held not good. It is likely that the courts would however now hold it to be good if there was no son of the name of John. But when it is sought to contradict an instrument which has an intelligible meaning, there is sound reason for enforcing the rule of exclusion. If there has been a mistake of expression, the proper remedy is by an appeal to a court of equity for correction. Under the code of the state of New York the amendment can be made and the instrument as amended enforced by judgment in the same action.—In the examination of witnesses, a very different mode is prescribed to the party calling a witness from what is allowed to the opposite party. The counsel of the former must not put leading questions, and if the witness should make adverse or unsatisfactory answers, still he was deemed the witness of the party and could be examined only in accordance with that theory; that is to say, he could not be cross-examined by such party. This at least was formerly the rule, but it has recently been relaxed so far as to allow him to be treated to some extent as an adverse witness, when it is apparent that he is so. On the other hand, cross-examination by the other party is allowed to an almost unlimited extent, and the privilege is often used to pervert rather than elicit the truth. It would be difficult to fix a precise limit of restriction, as it necessarily rests very much in the discretion of the court; but the prevailing practice, especially in the English courts, seems to be suited rather to a remote period, when from the disorders of society and consequent laxity of moral principle there was little reliance to be placed on the oath of witnesses, than to the present advanced state of social order, when the exigencies of vastly accumulated private transactions, and a superior intelligence extending to the lowest class, have induced a greater integrity, and when it may be assumed as a general rule that a witness is disposed to speak the truth.

EVORA (anc. *Ebora*, and *Liberalitas Julia*), capital of the province of Alemtejo, Portugal, and of a district of the same name, situated on high ground, 85 m. E. S. E. of Lisbon; pop. 15,000. It is surrounded by a wall, and contains the remains of 2 ancient forts. A splendid Gothic cathedral, a number of convents, hospitals, a house of charity, a diocesan school, barracks, and a museum are the principal buildings of modern date, while among its monuments of antiquity are a ruined temple of Diana, and an aqueduct by which the city is still supplied. Evora has some manufactories of hardware and leather.

EVREUX (anc. *Civitas Eburovicum*), a city of France, capital of the department of Eure, 52½ m. by railway from Paris, in a pleasant valley, on the Iton, which by means of a canal and a natural arm is made to water every part of the city; pop. in 1856, 10,615. It is surrounded by gardens, vineyards, and highly

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cultivated fields. At a little distance from the town was the fine old château of Navarre, founded in the 14th century, which was for 2 years the residence of the empress Josephine after her divorce, and was destroyed in 1836. Evreux has cotton and woollen mills.

EWALD, Georg Heinrich August von, a German orientalist and theologian, born in Göttingen, Nov. 16, 1803. He was one of the 7 professors who were dismissed in 1837 on account of their remonstrance against the unconstitutional proceedings of King Ernest Augustus of Hanover. He repaired to England, where he remained until 1838, from which time until 1848 he officiated as professor of theology at Tübingen. He was then reinstated in his chair at Göttingen, where he continues (1859) to hold a prominent position in the department of oriental languages and exegesis. He is one of the best living oriental scholars and biblical critics. Among his most important works are *Grammatica Critica Linguæ Arabicæ* (2 vols. 8vo., Leipsic, 1831–'33); *Ueber das äthiopische Buch Henock* (1854); *Ausführliches Lehrbuch der hebräischen Sprache des alten Bundes* (6th and enlarged edition, 1855; also an abridged edition of the same, *Hebräische Sprachlehre für Anfänger*, 2d ed., 1855). His principal theological work is his *Geschichte des Volkes Israel bis Christus* (3 vols. in 5, 8vo., 2d ed., Göttingen, 1851–'52). He was the projector of the *Zeitschrift für die Kunde des Morgenlands*, and since 1849 he has edited the *Jahrbücher der biblischen Wissenschaft*, in which he propounds his theological views, his leaning toward Baur and other adherents of the Tübingen school with whom he became acquainted during his residence in that city, involving him in many controversies. In 1841 he was ennobled by the king of Würtemberg.

EWALD, Johannes, a Danish poet, born in Copenhagen, Nov. 18, 1743, died there, March 17, 1781. He early displayed his love of romance by an attempt to go to sea, the reading of "Robinson Crusoe" having excited his imagination, but he was overtaken by his friends before he had reached the sea shore. He afterward joined the army in Prussia and Austria, but was eventually induced by his friends to return to Copenhagen, where he studied theology, and passed his examination in 1762. Disappointed in his love for a young lady whom he celebrated in verse under the name of Arense, he fell into a state of melancholy, which cast a gloom over the rest of his life, but tended to stimulate his poetic genius. He devoted himself to literature, was deeply impressed with the beauties of modern German poetry, especially of Klopstock's "Messiah," and became the author of exquisite lyrical poems and songs, which secure for him a prominent place among the classical writers of Denmark. His first composition, "The Temple of Fortune, a Vision," was followed in 1766 by a poem on the death of Frederic V. In 1769 appeared his lyrical drama of "Adam and Eve." His tragedy of *Rolf Kraga* (1770) was the first attempt to dramatize the ancient history of Denmark, and bears evidence of the careful study of both Ossian and Shakespeare. About this time he became lame, and poverty, neglect, and intemperance added to his misfortunes. He was eventually deserted even by his mother, and the last two years of his life were spent in the house of a benevolent friend. But his literary activity remained undiminished, and in 1771 and 1772, while in the greatest distress of mind and body, he wrote even humorous plays, which were very successful. His most celebrated work, *Baldur's Död* ("Baldur's Death"), a drama of great power and poetic beauty, devoted to the heroic reminiscences of Scandinavian mythology, appeared in 1773. His lyrics and sacred poetry, however, are now most admired. His finest lyrical poem, "The Fishermen," appeared in 1778. He also wrote a famous national song of Denmark, and some works in prose. He began to prepare his poetical works for publication, but the edition was completed only after his death (4 vols., Copenhagen, 1781–'91; 2d ed., 1814–'16).

EWBANK, Thomas, an American writer on practical mechanics, born at Barnard Castle, Durham, England, March 11, 1792. At the age of 13 he was apprenticed to a tin and copper smith, subsequently was employed for several years in London, and about 1819 emigrated to New York. In 1820 he commenced the manufacture of metallic tubing in that city, from which business he retired in 1836–'7 in order to devote himself to literary and scientific pursuits. In 1842 appeared his "Descriptive and Historical Account of Hydraulic and other Machines, Ancient and Modern; including the Progressive Development of the Steam Engine," a highly suggestive work, of which the 14th edition was published in 1856. In 1845–'6 he made a visit to Brazil, recording his observations in a work which was published in 1856 under the title of "Life in Brazil," with an appendix descriptive of a collection of American antiquities. In 1849 he was appointed by President Taylor U. S. commissioner of patents, in which capacity he prepared 3 annual reports, a portion of the first of which was published in pamphlet form in New York with an introduction by Mr. Horace Greeley. He retired from office in 1852. He has also published a work on the physical relation of man to the earth, entitled "The World a Workshop" (New York, 1855), "Thoughts on Matter and Force" (New York, 1858), and a variety of miscellaneous essays on the philosophy and history of inventions, which have appeared chiefly in the "Transactions of the Franklin Institute." His "Experiments on Marine Propulsion, or the Virtue of Form in Propelling Blades," was reprinted in Europe. As a member of the commission to examine and report upon the strength of the marbles offered for the extension of the national capitol, he made some suggestions which led to the discovery of a means of greatly increasing the power of resistance to pressure in building stones.

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EWING, John, D.D., an American divine, born in Nottingham, Md., June 22, 1732, died in Philadelphia, Sept. 8, 1802. He was educated in the college of New Jersey, was tutor in that college and instructor of the philosophical classes in the college of Philadelphia, and in 1759 became pastor of the 1st Presbyterian church in Philadelphia. In 1773 he visited England, and had interviews with Dr. Robertson, Lord North, and Dr. Johnson; the last of whom, affirming that the Americans were as ignorant as rebellious, said to Dr. Ewing: "You never read. You have no books there." "Pardon me," was the reply, "we have read the 'Rambler.'" When the college of Philadelphia was changed in 1779 to the university of Pennsylvania, Dr. Ewing was placed at its head as provost, and remained in this station together with his pastorate till his death. He was vice-president of the American philosophical society, and made several contributions to its "Transactions." His collegiate lectures on natural philosophy (2 vols., 1809) and a volume of sermons have been published since his death.

EWING, Thomas, LL.D., an American statesman and jurist, born in Ohio co., Va., Dec. 28, 1789. His father, who had served in the American army during the revolution, and had become reduced in circumstances, removed his family in 1792 to the Muskingum river, and thence to a place 17 m. N. W. of the frontier settlements, in what is now Athens co., Ohio. Thomas was taught to read by an elder sister, and devoured with avidity the few books within his reach, studying mostly at night by the light of hickory bark. In his 20th year he left home and worked in the Kanawha salt establishments, until in 2 or 3 years he had laid up money enough to pay for his father's farm and enable himself to enter the Ohio university at Athens. Having exhausted his purse, he returned to the salt works, laid by his earnings, then resumed his studies, and in 1815 received the first degree of A.B. ever granted by the Ohio university. He studied law in Lancaster, Ohio, was admitted to the bar in 1816, and practised with great success in the state courts and the supreme court of the United States. In March, 1831, he took his seat in the U. S. senate as a member of the whig party, and became associated with Clay and Webster in resisting what were deemed the encroachments of the executive. He spoke against confirming the nomination of Mr. Van Buren as minister to the court of St. James's, supported the protective tariff system of Mr. Clay, and during the same session advocated a reduction of the rates of postage, a recharter of the U. S. bank, and the revenue collection bill known as the "force bill." On Jan. 9, 1834, as a member of the committee on post offices and post roads, he presented a majority report on abuses in the post office department, accompanied by 14 resolutions of censure. These were afterward reduced to 4, and were passed by a small majority. The committee were directed to continue their investigations, and at the next session Mr. Ewing presented a second majority report, with a bill for the reorganization of the department. The bill passed the senate without opposition, Feb. 9, 1835, but was lost in the house of representatives; the postmaster-general, however, resigned, and the reorganization was effected during the following session. Mr. Ewing took a warm part in the debates on the removal of the deposits from the U. S. bank, which he looked upon as an unconstitutional measure, and on Dec. 21, 1835, he introduced a bill for the settlement of the much vexed Ohio boundary question, which was passed March 11 and June 15, 1836. During the same session he brought forward a bill, which became a law, for the reorganization of the general land office; and on several occasions he opposed the policy of granting preëmption rights to settlers on the public lands. He spoke against the admission of Michigan, on the difficulties with France, the deposit bill, the limitation of executive patronage, and the fortification bill, and presented a memorial for the abolition of slavery and the slave trade in the district of Columbia, which he insisted ought to be referred, though he was opposed to granting the prayer of the memorialists. In July, 1836, the secretary of the treasury issued what was known as the "specie circular," directing receivers in land offices to accept payments only in gold, silver, or treasury certificates, except from certain classes of persons for a limited time. In December Mr. Ewing brought in a bill to annul this circular, and another declaring it unlawful for the secretary to make such discrimination. The bills excited violent debates, and were not carried. In March, 1837, Mr. Ewing's term expired, and he resumed the practice of his profession. In 1840 he advocated the election of Gen. Harrison to the presidency, and when that gentleman came into office he became secretary of the treasury, which office he retained under President Tyler. His first official report, presented at the extra session in May, 1841, proposed the imposition of 20 per cent. *ad valorem* duties on certain articles for the relief of the national debt, disapproved the independent treasury act passed the preceding year, and urged the establishment of a national bank. He was requested to prepare a bill for the last purpose, which was passed with some alteration, but vetoed by the president. Mr. Tyler thereupon indicated to his friends a plan for a bank of moderate capital for the regulation of exchanges, and at his request Mr. Ewing helped to frame a charter, which was immediately passed and in turn vetoed. Mr. Ewing, with all the other members of the cabinet except Mr. Webster, thereupon resigned (Sept. 1841), and published his letter of resignation explaining his course. On the accession of Gen. Taylor to the presidency in 1849, he took office as secretary of the recently created department of the interior, which was still unorganized. Among the measures recommended in his first report, Dec. 3, 1849, were the extension of the public land laws to Califor-

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nia, New Mexico, and Oregon, the establishment of a mint near the California gold mines, and the construction of a road to the Pacific. On the slavery question he separated from his old associates, Mr. Clay and others, who urged the necessity of comprehensive legislation to settle the whole matter at once and for ever, while Mr. Ewing agreed with the president in thinking the action of congress uncalled for. On the death of Gen. Taylor and the accession of Mr. Fillmore, July 9, 1850, this division in the whig party was made the basis of a change of the cabinet. Mr. Corwin became secretary of the treasury, and Mr. Ewing was appointed by the governor of Ohio to serve during Corwin's unexpired term in the senate. In this body he was an active defender of Gen. Taylor's administration. He did not vote for the fugitive slave law, helped to defeat Mr. Clay's compromise bill, reported from the committee on finance a bill for the establishment of a branch mint in California, advocated a reduction of postage, river and harbor appropriations, and the abolition of slavery in the district of Columbia, and paid great attention to the business details of the senate, particularly as affecting the new territories. In 1851 he retired from public life, and has since resided in Lancaster, Ohio, engaged in the practice of law. Among the most elaborate of his written professional arguments are those in the cases of Oliver *vs.* Piatt *et al.*, involving the title to a large part of Toledo, Ohio; the Methodist church division; the McIntire poor school *vs.* Zanesville; and the McMicken will, involving large bequests for education. His celebrity as a lawyer and public speaker equals his reputation as a statesman.

EXARCH (Gr. *ἔξαρχος*, prince), in the eastern Roman empire, an ecclesiastical or civil dignitary invested with extraordinary authority. At first exarchs were officers delegated by the patriarch or synod to visit a diocese for the purpose of restoring discipline. The exarch was also the superior of several monasteries, in distinction from the archimandrite, who was the superior of one, and was of a rank inferior to that of patriarch and superior to that of metropolitan. In the modern Greek church the exarch is a legate *a latere* of the patriarch. He visits the provinces to investigate ecclesiastical cases, the differences between prelates and people, the monastic discipline, the administration of the sacraments, and the observance of the canons; and usually succeeds to the patriarchate.—As a civil officer, the exarch was a viceroy intrusted with the administration of one or more provinces. This title was given to the prefects who during the 6th, 7th, and 8th centuries governed that part of Italy which was subject to the Byzantine empire. They were instituted after the reconquest of Italy from the Ostrogoths by Narses to oppose the progress of the Lombards then threatening to occupy that country. They were 17 in number, held their court at Ravenna, continued their government till 752, and combined civil, military, judicial, and often ecclesiastical authority. They appointed dukes as vice governors for several parts of Italy. The exarchate was destroyed by the Lombards. When Pepin of France conquered Ravenna, it was ceded to the pope. The title of exarch for high civil and military officers remained in the West till the 12th century.

EXCELLENCY, a title borne originally by the Lombard kings, and then by the emperors of the West from Charlemagne to Henry VII. It was adopted in the 15th century by the Italian princes, who exchanged it for that of highness (*altezza*) after the French and other ambassadors had been permitted to assume it. In France it became about the middle of the 17th century a common title for the highest civil and military officers; and in Germany it was given also to doctors and professors in universities. It is the title of every nobleman in Italy; in France, a duke is addressed as *excellence*, and a prince as *altesse*. It is the usual address of foreign ministers and of the governors of British colonies. Newspapers sometimes speak of the president of the United States as his excellency the president, but there is no legal sanction for this, the founders of the government having decided after discussion to bestow no title upon the president. A committee of the senate reported in favor of the style "his highness," but the house opposed any other title of office than those expressed in the constitution. Massachusetts is the only state which by a constitutional provision grants the title of excellency to its governor.

EXCHANGE, a gathering place for the transaction of business. The merchants of Athens met at the Piræus, where commercial operations derived a picturesque character from the animated scene presented by the shipping in the harbor. The first regular commercial meeting in Rome was held 493 B. C., and was called the merchants' college. In Venice, Genoa, and other Italian cities, similar gathering places existed at an early day. The modern institution of exchanges dates more particularly from the 16th century. In continental Europe the name *Börse* in German, *bourse* in French, and *birza* in Russian, originated from the belief that the first gathering of the kind took place in the early part of the 16th century at Bruges, in Flanders, in the house of a family of the name of Van der Beurse. According to another tradition the first exchange was held at Amsterdam in a house which had 3 purses hewn in stone over the gates, thus accounting for the use of the word *bourse*. Previous to the latter part of the 16th century the London merchants used to meet without shelter in Lombard street. Sir Richard Gresham, having seen the covered walks used for exchanges abroad, contemplated erecting a similar building in London. The scheme was carried into effect by his son Sir Thomas Gresham, who offered to erect a building if the citizens would provide a plot of ground. The site north of Cornhill, in the city of London, was accordingly purchased in 1566 for about $18,000. On Jan. 23, 1570, Queen

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Elizabeth caused it to be proclaimed the "Royal Exchange." This structure was destroyed in the great fire of 1666. The new exchange was commenced at the end of 1667, and publicly opened for business Sept. 28, 1669. This building, which was 210 feet by 175, cost nearly $300,000, but was again destroyed by fire, Jan. 10, 1838. The corner stone of the present royal exchange was laid in 1842, and the building was opened Oct. 28, 1844, by Queen Victoria. It is an imposing edifice, embellished with many statues. The area appropriated to the meetings of the merchants is 170 feet by 112, of which 111 feet by 53 is uncovered. Here the English, German, Greek, Mediterranean, and other foreign merchants, all have their appropriate places and corners, and meet daily for the transaction of business. On Thursday and Friday an extra meeting for transactions in foreign bills of exchange takes place previous to the regular meeting, which is attended by the principal bankers and merchants of London, and which derives great importance from the immense business transacted within about half an hour. The whole foreign commerce which centres in London is here concentrated in a handful of bills of exchange. There is much less excitement than at the general exchange. A few brokers pass between the bankers and merchants, and the bills are bought and sold almost in a whisper.—The most celebrated continental exchange is the *bourse* of Paris, which was inaugurated in 1824. The building has the shape of an ancient peripteral temple; the exterior measures 234 feet by 164, the interior 108 feet by 59, exclusive of galleries, or 6,372 square feet, and is calculated to hold more than 2,000 persons. The Paris exchange is a combination of a stock and bill exchange, and confines itself chiefly to these branches of business. The St. Petersburg exchange approaches the Paris bourse in splendor. It was built between 1804 and 1810; its exterior is 330 feet by 246, its interior 190 feet by 90, or 17,100 square feet. The Hamburg exchange resembles also that of Paris in the shape and the grandeur of its building. The exchange of Amsterdam was finished in 1613, and is an edifice of great magnitude. The *bourse* of Antwerp, one of the oldest and most remarkable of Europe, which was chosen by Sir Thomas Gresham as a model for the royal exchange in London, was totally destroyed by fire, Aug. 2, 1858. A large portion of the commerce of the world was transacted in it for a considerable time. At Madrid, Lisbon, Leghorn, Marseilles, Trieste, Vienna, Smyrna, Odessa, Berlin, Frankfort, &c., the exchanges are numerously attended, but the exchange of London stands unrivalled in Europe for the magnitude of its transactions. Next to it in commercial importance rank the exchanges of Amsterdam and Hamburg.—The merchants' exchange in Wall street, New York, is erected on the site occupied by the exchange building destroyed by the great fire of Dec. 16, 1835. It occupies an entire block, is built of Quincy granite, and is fire-proof, no wood having been used in its construction except for the doors and window frames. The front has a massive portico with 18 columns, each of which is a solid block of granite, 38 feet high, 4½ feet in diameter, and weighing about 40 tons. The entire building is 200 feet long by 171 to 144 wide, and 124 to the top of the dome. Its central rotunda is constructed of white marble, and lighted by a lofty dome, which is in part supported by 8 Corinthian columns of Italian marble, 41 feet high. Its cost, ground included, was over $1,800,000.

EXCHANGE, Bill of, in commercial transactions, a written instrument designed to secure the payment of a distant debt without the transmission of money, being in effect a setting off or exchange of one debt against another. This important instrument is of modern origin. It was not because its use was not perceived that it was unemployed in ancient commerce, but because its basis is mercantile integrity, which never existed till a recent period in trading communities to a sufficient extent to warrant putting money or other valuable commodities at risk upon so frail a security. Thus we have evidence in the case of the Athenian banker, which is the subject of one of the discourses of Isocrates, that the convenience of such an exchange as is now usual among merchants was well enough understood then, but it was deemed necessary to take security for the payment of the bill. Transactions of the same kind have doubtless occurred at all periods where parties have had sufficient confidence in each other; but that they were unfrequent is manifest from the silence of the Roman law in respect thereto. It is said that the Jews of the middle ages first introduced bills of exchange into ordinary use, and this is entitled to credit, inasmuch as the frequent migrations and spoliations to which they were subjected in those times of persecution, made an easy transmission of wealth and its safe-keeping in foreign countries almost a necessity. Of course the bills drawn by them were upon persons of their own race. The negotiation of bills of exchange by law can be traced back about 4½ centuries, the earliest being an ordinance of the city of Barcelona in 1394 respecting the acceptance of bills of exchange. An edict of Louis XI. in 1462 is the first notice of the subject in the laws of France. (See Kent's "Commentaries," vol. iii. p. 72, note.)—In form, a bill of exchange is an order or request addressed by one person to another directing the payment of money to a third person. The first is called the drawer; the second is the drawee until the bill has been presented and accepted, and then he is called the acceptor; the third is the payee. But sometimes the bill passes through several hands, which may be either by successive endorsements specifying to whom payment is to be made, or by what is called an endorsement in blank, by which is meant that the payee, or the subsequent holder to whom the bill has been endorsed, merely writes his own name on the

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bill, which is equivalent to making it payable to bearer. The most important incident of a bill of exchange is its negotiability, that is to say, facility of transfer from one person to another. For this purpose it is essential that the engagement of the several parties, whether drawer, acceptor, or endorser, should be disentangled from all matters not appearing upon the face of the bill. This, therefore, is the general rule, subject to some exceptions which will be presently mentioned. Equally necessary is it that the bill itself should by its terms involve no uncertain contingency, as to depend upon an event that may not happen, or upon some condition which may be the subject of controversy. Hence it has been uniformly held that it must be payable at a fixed time, that is to say, at some period which is certain; but it may be so far contingent as to depend upon an event which must inevitably happen, though the precise time cannot be specified. Thus a bill may be payable a certain time after the death of a particular person; but it would not be a good bill if made payable after the arrival of a certain vessel. The one event is certain to happen at some period, though it may be remote; the other may not happen at all. Again, a bill of exchange must be expressed to be for the payment of money only, and would not be good if payable in cattle or other species of property, nor even if it is made payable in bank bills. In the state of New York it has indeed been held that a bill is good which calls for payment in bank bills current within that state, though it would not be so if specified that it is to be paid in bank bills of another state or country. But in England the rule is strictly adhered to that there must be no restriction in the bill precluding the right of the payee to be paid in specie if he chooses to demand it, and this is the generally received doctrine in the United States. When it is said that a bill is not good if subject to any contingency or payable otherwise than in money, it is intended merely that it is not negotiable with the legal effect which appertains to a bill drawn in the prescribed form. It may nevertheless constitute a valid contract between the original parties, and may even be transferred so as to vest in the assignee the same right which the payee would have had against the drawer or acceptor. The transfer in such case will, however, be subject to the same rules that apply to other personal contracts usually denominated *choses in action*. In other words, the transfer is itself a contract; and although it is not necessary that it should be in writing, yet it derives no aid from mercantile usage respecting the endorsement of bills. The delivery of a note not negotiable may give an ownership if so designed, and this is so in respect to a bond or other contract. But by the common law there was this limitation, that the right of the holder could be enforced only in the name of the original obligee, it being a rule that a chose in action was not assignable. In equity, however, the right of the assignee was recognized, and so to a certain extent it came to be in the common law courts, the formality of using the name of the assignor in a suit brought upon such chose in action being all that is retained of the old strictness. In the state of New York even this has been abrogated, and by the code of practice the real party in interest, by which is meant whoever has the actual ownership, although the aid of a court of equity may formerly have been necessary for enforcing it, must be the party to the action; and this has been followed in many other states. Again, such transfer confers no greater right than the original payee or obligee had, and is subject to any defence, legal or equitable, which the other parties had against such payee or obligee prior to actual notice of the assignment, or what in law would be tantamount thereto. The bill, or rather contract, as it should be termed in the case supposed, is itself also subject to one important rule distinguishing it from a proper bill of exchange, viz., that it does not import a consideration unless expressed. If, therefore, no consideration is specified, parol evidence thereof will be necessary, as the rule of the common law is that a consideration is an essential requisite of a contract; but parol evidence will be inadmissible in all those cases in which by statute it is required that the contract should be in writing, as when the contract is not to be performed within one year, or when it is to answer for the debt of another person, &c. It will now be understood what is the negotiability above referred to as being the peculiar incident of a bill of exchange. The bill, in the first place, imports *per se* to have been given for value even if it does not contain the usual clause "for value received," which, though generally inserted, is mere surplusage; and every successive holder who has received it before it was due, in the regular course of business, for a valuable consideration, is entitled to enforce it according to the terms of the obligation expressed therein, without regard to any transactions between the original parties. To this rule there are some exceptions, as when the bill was given for a gaming debt or when usury is involved, in which cases the bill is declared to be absolutely void by statutes in England, which have been generally re-enacted in the United States. When there has been fraud in the transaction to which the bill relates, which would have been a defence as between the original parties, the rule is that a *bona fide* holder for value is not affected thereby; with however this limitation, that the bill has been received not only without knowledge of the fraud, but without such notice of the circumstances as should have induced suspicion and inquiry. If the bill at the time of transfer has become due, this is in law deemed sufficient to call for inquiry, and the endorser in such case takes the bill subject to whatever defence there would have been against the party from whom he received it. There is one case, however, in which a bill is void for fraud even in the hands of a *bona fide* holder, viz., when it was drawn for a

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specific purpose, and has been fraudulently appropriated by the person intrusted with it to another purpose; as if the bill was made for the purpose of being discounted, and should be applied by the agent in payment of a debt due by himself. When a bill has been stolen or lost, and has been put into circulation again, a *bona fide* purchaser is entitled to enforce it against all previous parties, provided there were no circumstances that should have led him in the exercise of ordinary prudence to inquire into the title of the party from whom he received it. It will in such a case be a question of fact whether due diligence has been used by the holder, and the burden of proof is imposed upon him, upon its being shown that the bill had been stolen or lost. The question in such case would be between the person who had lost the bill or from whom it had been stolen, and the person who had received it after the theft or loss. The liability of the original parties is not affected.—Bills of exchange are of two sorts, foreign and inland; the former being drawn by a merchant in this country upon another residing abroad, or by a foreign merchant upon one residing here; the latter when both drawer and drawee reside in the same country. The principal rules relating to bills of exchange grow out of mercantile usage respecting foreign bills; but by statute in England and the United States both are now put upon the same footing, with the exception only that damages are allowed upon foreign bills which come back protested for non-acceptance or non-payment. In the state of New York these damages are fixed by statute at 10 per cent. upon the principal of any bill payable in Europe or in the West Indies, or on this continent north of the equator. The rate varies upon bills drawn in the state of New York payable in another state, being in some cases 5, in others 3 per cent. By statute in England and the United States, promissory notes are made negotiable in like manner as inland bills of exchange. The same principles therefore, in respect to negotiability and the legal incidents thereof, apply to both.

EXCISE, a term originally used in England in distinction from customs, which were duties levied upon merchandise imported or exported; excise duties being such as were imposed upon domestic commodities, chiefly those which were manufactured, as glass, soap, distilled spirits, &c. Both kinds of duties are designated by the term impost. A tax upon land or personal property by a percentage of the value, as is now the usual mode, is not classed with excise duties, which strictly apply only to what is annually consumed. They were first imposed by the long parliament in 1643, but a number of articles of foreign production were included in the act, as tobacco, wine, sugar, &c., which were charged with a duty in the hands of the retailer in addition to what had been paid upon importation. Since that time they have been regularly continued, with only some modifications as to the articles subject to duty and the rate of charge, the number of commodities having been however largely increased. The articles of foreign growth or manufacture are now transferred to the department of customs. Some of the domestic manufactures formerly subject to excise have by various statutes been exempted, as salt, wire, beer, cider and perry, hides, printed goods, candles, tiles, starch, glass, stone bottles; and the articles remaining subject to excise duty are hops, malt, paper, spirits, and stage and hackney coaches. Among the subjects of excise duty have been classed with some incongruity licenses and auctions. The duty on the former still continues; the latter has been repealed. The revenue derived from the excise in 1857 was £17,472,000, of which the proportion derived from malt and spirits was £15,842,837.—It has been much debated what is the relative advantage of excise duties as compared with customs. The latter mode of collecting duties is evaded to a large extent by smuggling; but so likewise, it appears, is the excise duty evaded, particularly in respect to malt and spirits. It is objected to the mode of collecting the excise, that it exposes a manufacturer's private operations, and thus deters him from making improvements. It was upon this ground that the duties upon glass were removed. The soap manufacturer was subjected to the same disadvantage that was complained of by the glass manufacturers, and the duty has since been repealed. Another objection has tended to make the excise duty more obnoxious than any other, viz., the arbitrary manner of enforcing it, which is felt to be an interference with private liberty and independence, which the common law has sedulously protected.—In the United States there is properly no excise duty. The revenue of the federal government is derived from customs or duties upon imported goods, tonnage duties on shipping, and land sales. In the several states there is a property tax, but differing in most of them from the similar tax in England in one important particular, viz., that the valuation of property is made annually.

EXCOMMUNICATION (eccl. Lat. *excommunicatio*, from *ex*, out of, and *communio*, communion), the highest ecclesiastical punishment, consisting of exclusion from fellowship with the church. It is distinguished by the Roman Catholic writers as greater (*anathema*) or lesser (*excommunicatio*); the former entirely cutting off the offender from the body of the church and the society of the faithful, and being proclaimed only when a sin has been mortal, manifest, and scandalous; the latter prohibiting from participation in the sacraments and in public worship, and, according to the *Pontificale Romanum*, being imposed especially upon those who cherish intercourse with anathematized persons. Only the lesser excommunication is in practice among most Protestants, though the Anglican church recognizes them both.

EXECUTION, in law, the final process to enforce the judgment of a court, according to the old maxim, *executio est fructus et finis legis*. In this larger application it includes the process of

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sequestration, formerly used by the court of chancery to carry into effect its decrees, attachments for contempt of court, and process in summary proceedings, as upon mandamus and the like; but in its ordinary acceptation it is a writ issued to enforce a judgment in a suit or action in a court of common law. It is unnecessary to speak of the execution in the various real actions which have become obsolete. In England the actions for recovery of real estate, whether corporeal or incorporeal, are, by statute 3 and 4 William IV., c. 27, now limited to ejectment, *quare impedit*, and actions for dower. The first is the ordinary mode of trying a title to lands, and the execution upon a judgment of recovery is a writ of possession, which in form is directed to the sheriff, commanding him to deliver to the plaintiff the possession of the lands so recovered. *Quare impedit* is an action by which the right to a benefice is determined, and takes its name from a clause in the old Latin form of the writ by which the defendant was commanded to appear in court and show the reason why he hindered the plaintiff from presenting a proper person to a vacant office in a church. Upon judgment in favor of the claim, the execution is a writ directed to the bishop commanding him to admit the person nominated by the prevailing party. The action also lies for an office in eleemosynary institutions, as hospitals and colleges, which are endowed for the support of their inmates, and the execution in such cases is the same, except that it will be directed to the corporate officers or persons who have the control of the institution. In respect to lay offices, as they are called in distinction from ecclesiastical and eleemosynary, the mode of proceeding is by *quo warranto*, or *mandamus*. The former was strictly a proceeding in behalf of the crown against any one who had intruded into an office, but is now allowed by statute in England (9 Anne, c. 20) to determine disputes between private parties claiming an office adversely to each other. The proceeding in that case, although in form in behalf of the crown, yet is stated to be on the relation of the person prosecuting, and upon judgment in his favor execution issues to remove the intruder. *Mandamus* is a remedy where there is a refusal to admit the claimant to an office, or where he has been wrongfully removed. If the claim be established, a peremptory mandamus issues, directed to the defendant, commanding him to admit or restore the claimant, who is in this case, as well as the proceeding by *quo warranto*, called the relator. This is, however, not strictly an execution, as if not obeyed it must be enforced by another process called an attachment. In other actions, where the subject is an injury to real estate, usually the remedy is a recovery of damages; but in some instances specific relief is given, as in an action for a nuisance there may be a judgment that it be abated, and the execution in such case follows the judgment. So in some personal actions, formerly there might be judgment for the delivery of the specific thing, as in detinue, which was brought to recover possession of chattels, and the judgment was enforced by an execution called a *distringas*, which commanded the sheriff to make distress of any goods of the defendant until he complied with the judgment; but if he still refused, there could only be an assessment of the value of the thing recovered, and a sale of defendant's property to pay the same. In the action of replevin, which was originally limited to the recovery of property which had been wrongfully distrained for rent, the writ by which the action was commenced directed the sheriff to replevy, that is, take the property in question, and deliver it to the plaintiff upon pledges to prosecute. If the defendant succeed in the action, the judgment is that he have return of the property, or if he elects, he may have an assessment of the value, and recover that amount as damages. In the former case the execution is for redelivery of the property, in the latter merely for the damages.—Before proceeding to the consideration of other actions, it will be proper to state the modifications which have been made in the United States in respect to those already noticed, limiting ourselves, however, to the state of New York. All the common law real actions are abolished except ejectment, which, in a simplified form, is used for the trial of title to land in all cases. *Quare impedit* is not retained, nor is there any action for the recovery of an office except the proceedings by *quo warranto* or *mandamus*. The action of detinue has been abolished, and the action of replevin has been extended to all cases of the wrongful taking or wrongful detention of personal property. In the latter action the plaintiff, instead of an actual replevy of the goods, may arrest the defendant and compel him to give bail, and the final judgment in such case will be for damages; and so the defendant, if he succeeds in a case where the goods have been replevied, may take judgment for the value, the execution being in either of these cases merely for damages.—We now come to the ordinary actions in which there is judgment for a money demand. At common law there are 3 forms of execution upon such a judgment: 1, a *fieri facias*, so called from the terms of the writ by which the sheriff is commanded that of the goods and chattels of defendant he cause to be made the amount of the debt or damages recovered; 2, *elegit*, which is a writ given by an ancient statute (13 Edward I., c. 18), whereby, if the plaintiff elected, possession of the goods and chattels of defendant was delivered to plaintiff under an appraisement of the value thereof, which to that extent was to be a satisfaction of the judgment; but if not sufficient, then possession of one half of the freehold lands of defendant was also to be delivered until from the rents and profits thereof the judgment should be paid; 3, a *capias ad satisfaciendum*, which is a writ directed to the sheriff commanding him to take the body of the defendant, and keep the same until satisfaction of the debt. The course of proceeding upon this writ was to imprison the defendant in the

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debtors' gaol, of which the sheriff had in law the charge. It will not be necessary to follow the changes which have been made by statute in England. The present state of the law has been sufficiently stated in the article DEBTOR AND CREDITOR. Having traced the origin of the terms applied to executions, we shall limit ourselves to a brief explanation of the legal incidents as now prescribed by statute in the state of New York, to which there is a general conformity in the laws of most of the other states. There are but two forms of execution, viz., the *fieri facias* and the *capias ad satisfaciendum*, which have been already explained, and which are designated by the abbreviated terms *fi. fa.* and *ca. sa.* The *fi. fa.* is a writ directed to the sheriff by which he is commanded to make the amount of the judgment by sale of the defendant's goods and chattels, or if these should not be sufficient, then of the lands of which he was seized on the day when the judgment was docketed. An exemption is made of certain property from levy under execution, viz.: kitchen utensils, necessary provisions for family use, necessary fuel for the use of the family for 60 days, necessary wearing apparel, bedding, &c., mechanic's tools and implements to an amount not exceeding $25, a family Bible, family pictures, school books and other books not exceeding $50 in value, a pew in a church, land set apart for a burial place not exceeding ¼ of an acre; and in addition, a lot and building occupied as a residence by the debtor, being a householder and having a family, to the value of $1,000; but if the premises so occupied shall exceed that amount in value, the debtor must pay over the surplus, or the premises may be sold subject to the payment of $1,000 of the proceeds to the debtor. (See FIERI FACIAS.) The *ca. sa.* is the old form of execution against the person of the defendant. By the act to abolish imprisonment for debt, passed in 1831, and the provisions of the code of 1849 and subsequent modifications, there is no longer a liability to arrest for debt, either upon mesne or final process, except in certain specified cases, viz.: when the action is for an injury to person or character, wrongfully taking or detaining property, embezzlement or fraudulent misapplication of property by a public officer, or by an attorney or counsellor or officer of a corporation, or by a broker or other person acting in a fiduciary capacity, or where the defendant has been guilty of a fraud in contracting the debt, or attempting to avoid the payment of it by removal or other disposition of his property. An execution against property is made returnable in 60 days from the time when it is issued. The sheriff may make a return earlier, but is not compelled to do so. An execution against the person cannot be issued until the return of an execution against property. As to the mode of discharge from an execution against the person, it has already been considered in the article DEBTOR AND CREDITOR. (See also BANKRUPT.)

EXECUTOR, the person appointed to carry into effect the directions contained in a last will and testament. By the common law of England, or rather by the law as administered in the ecclesiastical courts, which have the exclusive jurisdiction of the probate of wills and the granting of letters testamentary, an infant of the age of 17 was qualified to act as executor. Prior to that age, letters of administration were granted to some other person *durante minore ætate;* but by statute 38 George III., c. 87, such administration must now continue until the person named as executor has reached the age of 21. A married woman cannot act as an executrix without the assent of her husband, inasmuch as he is responsible for her acts. Letters of administration may issue to the wife in case of the absence of the husband from the country, or of his legal incompetency, upon her procuring some one to execute an administration bond in place of the husband. As no bond is required upon issuing letters testamentary, it would seem that the wife should be entitled without giving security when the husband is absent or incompetent; yet if he is to be held liable for her acts, his consent must be necessary, or security given in place thereof. When executors are not named in a will, or are incompetent, or refuse to act, letters of administration with the will annexed may be issued, under which the same powers may be exercised that could have been by competent executors duly appointed. By statute in the state of New York, no person is competent to serve as an executor who is incapable in law of making a contract (except a married woman), or is under the age of 21 years, or an alien, or has been convicted of an infamous crime, or shall be adjudged incompetent by the surrogate, by reason of drunkenness, improvidence, or want of understanding. It is further provided that a married woman shall not be entitled to letters testamentary unless her husband consent thereto by a writing filed with the surrogate. In such case the letters issue to her, and she administers in her own name; but letters of administration (which issue when there is no will) must be taken out by the husband in behalf of the wife. When a woman who is acting as executrix or administratrix marries, her letters are not thereby superseded, but may be revoked upon the application of any person interested. The husband would probably be liable for her acts as administratrix if he took no proceedings to take out letters of administration in his own name, and for her acts as executrix if he makes no application for the revocation of her power. An executor *de son tort*, as he was formerly called, *i. e.*, one who intermeddled with the estate without having lawful authority, was liable to the extent of any assets which he might have appropriated to be sued as an executor of his own wrong, but was not entitled to institute a suit as executor. In the state of New York, any one intermeddling with the estate of a deceased person without having an appoint-

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ment as executor or administrator, may be made liable to the rightful representative as a wrong doer, but cannot be treated as an executor of his own wrong. An alien cannot be either an executor or administrator, unless he is an inhabitant of the state. Letters testamentary or of administration issued abroad are not recognized in New York; but if issued in another state, by competent authority, the person appointed will be entitled, on production of such letters, to receive letters of administration. It is held, however, that a foreign executor or administrator may be called to account for assets received abroad and brought here.

EXELMANS, Remy Joseph Isidore, count, a French general, born in Bar-sur-Ornain, Meuse, Nov. 13, 1775, killed by a fall from his horse, July 10, 1852. He served first in Italy, became an aide-de-camp of Murat, whom he followed to Germany, and attracted the attention of Napoleon, who made him a colonel after the battle of Austerlitz. In 1806 and 1807 he fought in the campaigns of Prussia and Poland. In 1808 he accompanied Murat to Spain, where he was taken prisoner and carried to England, whence he escaped in 1811, and rejoined Murat, then king of Naples. He returned to France, however, as soon as Murat's policy began to clash with that of Napoleon, and served in the Russian campaign with the rank of general of division, when he was severely wounded. In 1813 the emperor intrusted him with the command of the army in Saxony, and afterward of the operations in Holland. During Napoleon's exile at Elba he was at first treated with great distinction by the Bourbons, who conferred upon him the title of count; but afterward he incurred their displeasure by a congratulatory letter which he wrote to Murat, and which was intercepted. He was acquitted, however, by the court martial before which he was tried. He hailed Napoleon's return from Elba with enthusiasm, and, after having been raised to the French peerage in June, 1815, he resumed his duties in the army of the emperor, and fought with his wonted bravery in the battle of Waterloo. After passing several years in exile, he received in 1819 permission to return to France, and was to some extent reinstated in his military position. Louis Philippe restored him to the chamber of peers, where he denounced the execution of Ney as an "abominable assassination." Under Louis Napoleon he was appointed in 1850 grand chancellor of the legion of honor, and in 1851 marshal of France.

EXETER (Ind. name *Squamscott*), a township and one of the capitals of Rockingham co., N. H., situated on Exeter river, a branch of the Piscataqua, 14 m. S. W. from Portsmouth; pop. in 1850, 3,329. The Boston and Maine railroad passes through Exeter village, which is built around the falls upon both banks. The tide flows to the falls, to which place the river is navigable for small schooners. Manufacturing is largely carried on. The Exeter company was incorporated in 1829 with a capital of $170,000, for the manufacture of cotton goods. The mills contain 7,224 spindles. The New England gas-pipe company was incorporated in 1848, with a capital of $100,000. There are also 3 saw mills, 4 grist mills, and 1 steam planing mill. In the western part of the township is a village where paper, carriages, morocco, and other articles are extensively manufactured. The total value of manufactures yearly is estimated at $450,000. The principal village is pleasantly situated on a plain. The streets are wide and shaded by elm trees. The court house and town hall is a handsome brick edifice, erected in 1855 at a cost of $32,000. There are 9 church edifices—2 Baptist, 1 Christian, 2 Congregational, 1 Methodist, 1 Roman Catholic, 1 Second Advent, and 1 Unitarian. There are 13 public schools, 1 female seminary, and Phillips academy for boys, 2 banks with a capital of $200,000, a savings institution, and a public library containing 2,100 volumes. Phillips academy was founded in 1781 by John Phillips, LL.D., who bequeathed to it property valued at the time at about £10,000. The settlement of Exeter was commenced July 4, 1638, by a party of emigrants from Massachusetts bay, under the lead of the Rev. John Wheelwright, who had been banished from that colony on account of his adherence to Antinomian opinions. They purchased lands of the Indians near the falls on the Squamscott, and named the town after Exeter in England. They formed a church, and made themselves a body politic by choosing rulers. Their laws were made in popular assembly, and were formally assented to by the people. It was a near approach to a pure democracy. The town suffered severely during the Indian wars from 1690 to about 1710. A portion of it was annexed to South New Market in 1853.

EXETER, a city, port, and parliamentary borough of England, capital of Devonshire, and a county in itself, on the Exe, 10 miles from its mouth, 159 m. W. S. W. from London; pop. in 1851, 32,810. The Exe is here crossed by a handsome stone bridge leading to the suburb of St. Thomas. The city, standing on a steep acclivity, has 2 wide principal streets, which cross each other at right angles near its centre. It is generally well built, has many fine squares and terraces and ancient houses, and in its suburbs and environs are numerous elegant villas. It was formerly strongly fortified, but its exterior wall is now in a ruinous state, and a part of the rampart has been converted into a promenade. On an eminence N. E. of the town is Rougemont castle, formerly the residence of the West Saxon kings, repaired by William the Conqueror. Exeter is the seat of a bishopric founded in 1049. Its cathedral, a magnificent building of cruciform shape, was begun in the 11th century. Its entire length is 408 feet; it has 2 Norman towers 130 feet in height, 10 chapels or oratories, and a chapter house. One of the towers contains an immense bell weighing 12,500 lbs., and the other has a peal of 11 bells. Among the numerous schools is a free grammar school founded by the citizens in the reign of

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Charles I., in which the sons of freemen are instructed gratuitously, and which has 16 exhibitions to either of the universities. Exeter has a theatre and various literary and charitable institutions. The commerce of Exeter is much less now than formerly, but as the metropolis of Devon and Cornwall it has considerable internal trade. The river Exe is navigable for vessels of large burden to Topsham, 3 m. below Exeter; and by means of a canal built in 1563, subsequently much enlarged, and one of the oldest in England, vessels of 400 tons burden can come up to the quay near the walls of the town. The registered shipping of the port, Dec. 31, 1856, was 172 vessels of 21,546 tons; entrances during the year, 638 vessels of 64,175 tons; clearances, 216 vessels of 12,951 tons. Serges and other woollen goods were formerly manufactured in this city and the neighboring towns to a large extent, and shipped hence to the continent and the East Indies; but the introduction of machinery and the lower price of fuel in the north of England have very much diminished this trade.—This city is of unknown antiquity, and is the Caer-Isc of the Britons, and the Isca Damnoniorum of the Romans. It was the capital of the West Saxons, and in the reign of Alfred in 876 it was surprised by the Danes. It was besieged and taken by William the Conqueror. In the reign of Henry VII. it was successfully defended against Perkin Warbeck, who landed with an army in Cornwall. It sustained a siege in the reign of Edward VI., when the religious changes and the enclosure of lands which had been common while the monasteries existed caused a general insurrection of the people of Cornwall and Devonshire. In the civil war it espoused the royal cause, was taken by the parliamentarians, was retaken by Prince Maurice, became the head-quarters of the royalists in the west and the residence of Charles's queen, and in 1646 surrendered after a blockade to Gen. Fairfax. Exeter has returned 2 members to parliament ever since the reign of Edward I.

EXHAUSTION (Lat. *exhaurio*, to draw out), a method of the ancient geometry, applied with peculiar success by Archimedes, by which the value of an incommensurable quantity was sought by obtaining approximations alternately greater and less than the truth, until two approximations differed so little from each other that either might be taken as the exact statement. Thus the length of a circumference was sought by calculating the length of inscribed and circumscribed polygons, and increasing the number of sides until the lengths of the outer and inner polygon were sensibly the same, when that of the circumference could not differ sensibly from either. Exhaustion is now interesting chiefly because it led, in the 17th century, to the invention of the differential calculus.

EXHILARATING GAS. See Nitrogen.

EXMOUTH, Edward Pellew, viscount, an English admiral, born in Dover, April 19, 1757, died in Teignmouth, Jan. 23, 1833. He entered the royal navy in 1770, and in 1775 was a midshipman of the frigate Blonde, which carried Gen. Burgoyne to America, and first saw active service in the American revolutionary war. Appointed to the armed schooner Carleton, on Lake Champlain, he took a brilliant part in the naval action of Oct. 11, 1776, and distinguished himself in the same waters on several subsequent occasions. Attached to the army with a party of seamen under his orders, he rendered invaluable assistance during the difficult advance of Burgoyne to Saratoga, and, though a midshipman only 20 years of age, was called to the council of war at which that general's capitulation was determined. Young Pellew pleaded earnestly that his naval brigade might not be included, urging that they had been the pioneers of the army, and could make their way back to the St. Lawrence. But he was overruled, and sent home as bearer of despatches, receiving immediate promotion. In June, 1780, being first lieutenant of the frigate Apollo, he succeeded to the command, the captain being killed at an early period of a severe action fought with a French frigate off Ostend. It ended in Lieut. Pellew driving the enemy on shore under the neutral batteries; and for his good conduct he was made a commander. In 1782 the rank of post captain was awarded him for a successful conflict with 3 French privateers, inside the isle of Bass. From 1786 to 1791, he commanded successively the frigates Winchester and Salisbury on the Newfoundland station, but on the breaking out of the war with France in 1793, he was appointed to the Nymphe, 36, for employment nearer home. He soon signalized himself by fighting and capturing the French frigate Cléopatre. This was the first prize taken in the war, and it gained Capt. Pellew the honor of knighthood. His next ship was the Arethusa, a name immortalized in Dibdin's naval songs; and his merit procured him, in 1794, the command of the famous flying squadron of crack frigates, organized for service in the British channel. In 1795 he was moved into the frigate Indefatigable, and was actively engaged in blockading and watching the French coast. In January of the following year, while he was refitting at Plymouth, the Dutton, a large transport ship, with troops on board, was driven on the rocks in a terrific gale. Sir Edward, who chanced to be on shore, by extraordinary personal exertions, got on board, assumed direction, and succeeded in saving the lives of all on board. He himself, the first to render assistance, was the last to swing himself ashore, and the wreck shortly afterward went to pieces. The whole deed was so brilliant and masterly that it created an immense sensation, having been witnessed also by thousands of spectators. Plymouth voted the modest hero of it the freedom of the town, in a gold box; Liverpool, a service of plate; George III. created him a baronet, as Sir Edward Pellew of Treverry; and a stranded ship was quartered in his armo-

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rial bearings. The blockade of the harbor of Brest and various minor sea fights ensued. In 1799 he commanded the Impétueux, 78; and in that ship, as in the Indefatigable, he breasted and broke, so far as his own crews were concerned, the mutinous spirit which was rank in the British navy about this period, and assumed from time to time a perilous significance. In 1800 he took part in the abortive expedition against Ferrol, but under superior officers. During the short peace that followed the treaty of Amiens, Sir Edward was elected member of parliament for Barnstable. In 1803, on the renewal of hostilities, he was appointed to the Tonnant, 80, and proceeded to blockade a French squadron at Ferrol; but he was recalled in the following year, to support the admiralty under Earl St. Vincent in the house of commons, against a motion of censure brought forward by Mr. Pitt, and contributed greatly by his straightforward testimony to the vote which exonerated the head of the naval department. In the same year Sir Edward became rear admiral, receiving simultaneously the appointment of naval commander-in-chief in India. He hoisted his flag in the Culloden, and until 1809 was occupied in protecting commerce against French privateers in the eastern seas, destroying also several French ships of war at Batavia and other Dutch East Indian ports. In the spring of 1810 the North sea squadron was placed under his orders, and a year later he succeeded Sir Charles Cotton in the Mediterranean. Blockading Toulon, Genoa, and the various harbors that are scattered along the northern coasts of that sea, was his occupation during the next 3 years, which, if not marked by any salient points, were unchequered by disasters. At the close of the war, when honors were freely bestowed upon the British army for its triumphant campaign in the Peninsula, it was thought right that one peerage should be awarded to the navy. For this distinction Sir Edward Pellew was selected, and he was created Baron Exmouth of Canonteign. A pension was also granted him, as usual when a peerage is awarded for public services. A commandership and then a grand cross of the bath soon followed; but the admiral's services were not yet complete. When Napoleon escaped from Elba, he again hoisted his flag in the Mediterranean, proceeding first to Naples, where he landed a body of marines, and preserved order. Early in July, 1815, he embarked an Austrian force at Genoa, under Sir Hudson Lowe, and sailed for Marseilles, which they protected from the attack of Marshal Brune, who threatened to march thither from Toulon. The inhabitants presented him a splendid testimonial in plate, bearing the inscription: *A l'amiral mi lord Exmouth, la ville de Marseilles reconnaissante.* In March following, he was ordered to demand from the Barbary chiefs the release of all the Ionian prisoners enslaved, the Ionian islands having just come under British guardianship. The dey of Algiers, first visited, complied. At Tunis, however, Lord Exmouth's interpreter gave the bey to understand that he was required to abolish Christian slavery altogether. He consented, as did his colleague of Tripoli. Lord Exmouth hereupon returned to Algiers, and pressed the same demand, but not with the same result. The dey refused this further concession, and the violent conduct of his myrmidons nearly brought on him summary chastisement. But the admiral had already exceeded his instructions, and not feeling justified in proceeding to hostilities, agreed that negotiations should be transferred to London and Constantinople, warning the dey that he might be compelled eventually to return, in which case he further undertook to batter down the defences of Algiers with 5 line-of-battle ships only, a prophecy most accurately fulfilled. The boast might have been termed presumptuous, but Lord Exmouth never trusted to chance. He had at that moment in his possession accurate plans and soundings made expressly for him, which corrected many grave errors in the admiralty charts. These latter had doubtless been the ground of Lord Nelson's expressed opinion that 25 line-of-battle ships would be necessary to bring the dey to terms. On the return of the squadron to England, preceded and followed by tidings of fresh outrages, it was determined, after a stirring debate in the house of commons, that the Algerines should be forced into submission. Lord Exmouth was empowered to execute the task, and allowed an unrestricted selection of material. Greatly to the surprise of the admiralty, and in the teeth of protests from many naval officers of ability and experience, he persisted in limiting his main force to 5 line-of-battle ships, including the Queen Charlotte, which was to carry his flag, and one other three-decker. There were also 5 frigates, 4 bomb vessels, and 5 gun brigs. The squadron was to be manned by volunteers; and as the expedition was a perilous one, Lord Exmouth peremptorily refused his brother, his two sons, and his two sons-in-law, all officers who had served under him with more or less distinction, permission to accompany him. The fleet sailed from Portsmouth on July 25, and thus the raw hands, of whom the crews were mostly composed, had but a month's training at the guns. On touching at Gibraltar, the Dutch vice-admiral, Baron Van der Capellan, being there with 5 frigates and a corvette, earnestly begged leave to take part, which was accorded. On Aug. 27 the fleet arrived off Algiers, and a flag of truce with the admiral's demands was sent in, the vessels lying-to about a mile from the town. At 2 P. M., no answer having been received, the Queen Charlotte led in to the attack, every detail of which had been preconcerted with the most consummate judgment. Algiers was very strongly defended. A series of forts and batteries faced the sea, massively built and heavily mounted, the guns that commanded the sea approaches being estimated at nearly 500. These had all been put in repair, new works being also added. In the harbor, which is artificial, and has an entrance only 120

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yards wide, lay 4 frigates, 5 large corvettes, and 39 gun boats. The garrison had been increased to 40,000 men. The dey was bent upon obstinate resistance. So confident also was he in his preparations and resources, expecting moreover to be able to carry the ships by boarding from his gun boats, which were crowded with men, that the Algerines allowed the British flag ship and another one to take their stations before firing a shot themselves. The Queen Charlotte accordingly was anchored by the stern, a half-cable's length from the mole head, being there lashed to the mainmast of an Algerine brig, abandoned at the harbor's mouth. The plan of attack, most ably conceived, was carried out with gallantry and skill by all the ships engaged, including the Dutch auxiliaries, who bore their full share of the brunt. Lord Exmouth had rightly estimated the power of his own ship's unerring and tremendous broadside. It soon silenced the battery on the mole; but the Algerines fought their numerous guns with precision and intrepidity, and at an early period of the engagement their gun boats daringly swept up to board the admiral and the frigate next him. Concealed at first by the dense smoke, they were discovered ere they ranged alongside, and nearly all sunk by a few well-directed shots. At great risk the Algerine fleet was subsequently fired and burnt, the Queen Charlotte, from her close proximity, narrowly escaping a similar fate as one of the burning vessels drifted past her. Toward night, as the guns on shore became silenced, and the ammunition fell short, the fleet gradually slackened fire; and at 11 P. M. the admiral hauled off, after an engagement of nearly 9 hours' duration. The material result of this fierce and protracted bombardment was that nearly all the Algerine batteries toward the sea were crumbled into ruins, together with a large portion of the town, and that the arsenal and armed shipping were burned. The damage was enormous. The dey reported his loss in men as exceeding 7,000. Of the British force 818 men were killed and wounded, and 65 of the Dutch. No officers of distinction fell, though the admiral himself had several narrow escapes. He was struck in 3 places, and a cannon shot tore away the skirts of his coat. The moral effect of the achievement was in keeping with the material. On the morning after this severe lesson, the dey submitted to all the demands that had been made upon him by Great Britain, including the abolition of Christian slavery for ever, and the immediate release of 1,200 slaves of all nations. On Lord Exmouth's former visit to the Barbary coast 1,800 had been set at liberty. Returning to England, the victor in this memorable conflict was welcomed with unbounded enthusiasm. He was advanced to the dignity of a viscount, received the thanks of parliament, and was knighted by several of the continental potentates. In 1817 the naval command at Plymouth was given him, which he retained for 3 years, and then retired into private life. In seamanship, vigilance, coolness, readiness of resource, promptness and accuracy of judgment, and the sagacious adaptation of means to an end, Viscount Exmouth had no superior in the service of Great Britain. He was never foiled; never failed. As a schoolboy, under 10 years of age, he gave proof of his resolute spirit, by entering a house on fire to bring out a keg of gunpowder, when no other bystander durst approach. As a captain in the Winchelsea, when his crew were close-reefing the main topsail, in a hard gale on a dark night, his voice was suddenly heard from the yard-arm, the most perilous position. Jumping overboard to save life was of frequent occurrence with him. When his flag ship, the Culloden, took fire off the Coromandel coast, and many of the crew jumped overboard, and there was general confusion, he beat to quarters, ordered the marines to fire upon any one attempting to leave the ship, cut the tackles of the boats to prevent their being hoisted out, restored confidence, and had the fire extinguished. Among a mutinous crew, on a lee shore, or in the heat of battle, he was always the same—always ready, always resolute. In addition to all this, he was religious, loyal, truthful, humane, and charitable.

EXODUS (Gr. *ἔξοδος*, departure), the going out or departure of the Israelites from Egypt under Moses. This event has been largely discussed by critics and commentators, and there is very considerable discrepancy in regard to the date of the exodus, the place where the Hebrews crossed the Red sea, the nature and extent of the miracle connected with this passage, &c. Dr. Robinson advocates the view that the Red sea was crossed at or near Suez; other critics and travellers express themselves convinced that the passage was effected at Ras Attaka, where the Valley of Wandering terminates. The date of the exodus is fixed by Usher at 1491 B. C., by the Septuagint 1614 B. C., by Dr. Hales 1648 B. C., and by Bunsen, Lepsius, and Wilkinson at or about 1320 B. C. in the reign of a Pharaoh whose name was Pthahmen or Menephthah. —The book of Exodus is the second of the Pentateuch, or five books of Moses. It gives a narrative of the fortunes of the Israelites after their migration into Egypt, the birth and education of Moses, the plagues inflicted on the Egyptians, the departure of the Hebrews, the passage of the Red sea, the giving of the law on Mount Sinai, and the erection of the tabernacle, and includes the period from the death of Joseph to the end of the first year after the going out of Egypt.

EXOGENS (Gr. *ἔξω*, outward, and *γεννάω*, to generate), a class of plants so called because their woody matter is increased by additions to the outside of that which first surrounds the central pith. As there are no specific limits to the age of exogenous trees, their diameter indefinitely increases by this annual process, a distinct external layer being added by each year's growth. The stem of an exogen consists of a central column of pith or medulla, woody zones, and bark. Processes from the central medulla called me-

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dullary rays cross the zones transversely. The bark of an exogen parts readily from the underlying wood at a particular season of the year, when a viscid secretion called *cambium* is produced between the wood and the inner surface of the bark. It is at this period that the leaves expand and the trunk lengthens. The woody fibres in the leaves are prolonged into the stem or trunk, passing down among the cambium, and adhering partly to the wood and partly to the bark of the previous year. By this means new living matter is continually deposited upon the outer portion of the woody stem and the inner portions of the bark. It is in this part of the stem that the intensest vitality exists, the outer and older layers of the bark and the inner and older concentric rings of the wood becoming inert and falling off or decaying without injury to the vegetative parts. The office of the medullary processes is very important as means of communication between the centre of the stem and the outside layers or rings; and they are conduits, so to speak, by which the fluid matter passing down the bark can reach the wood next the medulla or pith. These processes, which resemble thin plates, are of a spongy nature similar to that of the pith from which they originated. They sometimes assume sinuosities and undergo partial obliteration; and sometimes the wood itself assumes an excessive irregularity. As these circumstances are to be found mostly in tropical exogenous trees, vines, and climbers, difficulty is sometimes experienced in perceiving from transverse sections their claims to be considered as exogens. This natural character of an outward growth in the exogens is associated with other peculiarities of development of other organs. Thus, the leaves have veins ramifying from the midrib outwardly to the circumference; or if there are several ribs, the veins are still of the same quality, so as to form an irregular network. These veins never run parallel to each other without ramifications, and even some which appear to do so will be found to possess secondary veins. The leaves also fall away from the branches, being disarticulated from their places of insertion, leaving a clear scar behind. Certain foliolar organs, called stipules, are also frequently attached to the leaves, which is very unusual in endogens. The flowers are quinary, that is, they have 5 sepals, 5 petals, and 5 stamens, or some power of that number. The tall and feathery outline of the palms is never seen in the exogens, as none of them depend on a single terminal bud for their developing growth. From the very germination of the seed the difference is apparent in the form of the embryo and in the dicotyledonous characteristics of the young plant.

EXORCISM (Gr. *ἐξορκίζω*, to conjure), a rite having for its object the casting out of evil spirits. As the natural attendants of a belief in demoniacal possession, exorcisms have been practised in every age and country. The pagans of old, like those of to-day, attributed diseases which baffled their skill, and almost all misfortunes of which they did not readily perceive the cause, to the agency of malignant spirits, whose power they sought to break by incantations, music, the use of certain words, burning drugs or chemical compounds, amulets, &c. Epicurus and Æschines were the sons of women who lived by such arts, and were accused of having sometimes assisted their mothers in the imposture. Even human sacrifices were resorted to in order to destroy the spells of demons. Josephus tells us that Solomon acquired great skill in exorcising, and left several formulas to be used in the ceremony. He gives a curious example of the efficacy of the king's system which he says fell under his own observation. The exorcist "put a ring that had a root of one of those sorts mentioned by Solomon to the nostrils of the demoniac, after which he drew out the demon through his nostrils; and when the man fell down immediately he adjured him to return unto him no more, making still mention of Solomon and reciting the incantation which he composed." In the book of Tobit we read of an exorcism practised by Tobit at the bidding of an angel. Neither the belief in diabolical possession nor the use of exorcisms was condemned by our Saviour, and the cure of persons tormented by devils was among the commonest proofs of a divine mission given by him and his disciples. The devil-worship of the pagans led to a general practice in the early church of exorcising converts before baptism; in the case of the "energumens," or really possessed, it was intended to cast out the evil spirit; in others it was merely to break the power of Satan over the convert by driving out wickedness, and was a symbol of belief in original sin and of the horror with which Christians ought to shun the devil and his works. With this view the Roman Catholics have always retained it, even in the baptism of infants. They exorcise water before blessing it, in token of disbelief in the pagan doctrine that all useful things are given and presided over by spirits, and not unfrequently they seek by exorcisms to allay storms and check the ravages of noxious animals and insects. All such are called ordinary exorcisms; extraordinary are those pronounced over energumens. The form used for such purposes greatly varies; in some cases it is very simple, but when the subject is an energumen it is attended with many ceremonies. The exorcist marks the subject with the sign of the cross, sprinkles him with holy water, reads over him various litanies, psalms, and prayers, abjures the demon by the mysteries of the Christian religion to afflict the person no more, and commands him in the name of Jesus Christ to depart. The exorcist in such cases is a priest who must receive special authority from the bishop, but in former times the duty was intrusted to an inferior clerk. The order of exorcist is the 3d of the minor orders, and is still retained, though its functions are performed by priests.—The art of casting out devils is the subject of several very curious old works, one of the most

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remarkable of which is the *Thesaurus Exorcismorum et Conjurationum terribilium, potentissimorum, efficacissimorumque, cum Practica probatissima, quibus Spiritus maligni, Dæmones, maleficaque omnia de Corporibus Humanis tanquam Flagellis Fustibusque fugantur, expelluntur. Doctrinis refertissimus atque uberrimus: ad maximam Exorcistarum Commoditatem in lucem editus et recusus* (Cologne, 1608). In this we have not only the verbal formulas to be used, with the most efficacious drugs for fumigations (*profumigatio horribilis*), but directions for dieting the possessed on bread, mutton, and wine or holy water, and for administering emetics and other wholesome medicines. A picture of the demon, *effigie horribili ac turpi*, with his name written under it, thrown into the flames, is said to be an excellent remedy, and a judicious use of vituperative epithets may compel the spirit to tell his name, which is always an important consideration. (See DEMON.)

EXOSTOSIS (Gr. ἐξ, out of, and ὀστεον, bone), an osseous tumor developed on the surface of a bone, originally or eventually continuous with its substance, circumscribed, without interior cavity, having the same structure and life as the bone on which it is found. There are two varieties of this growth; in one the bone, like all other tissues of the system, takes on a morbid development, an eccentric hypertrophy of its substance, forming a well-defined tumor on its surface by the mere excess of interstitial osseous deposit; in the other the new ossific matter is deposited originally on the surface, under or between the laminæ of the periosteum, separated from the bone at first by cartilage, but afterward becoming consolidated to it in the usual manner of bony processes. The first variety may affect the greater part of a bone, and deserves rather the name of *hyperostosis;* and the second, by the progress of ossification, may be converted into the first; this distinction is of considerable importance in the prognosis and treatment of the affection. The muscles and soft parts over an exostosis are generally not changed, unless the tumor be of considerable size and in the neighborhood of large nerves and vessels; but the periosteum is almost always thickened, and less adherent to the bone than usual. In the first variety the form is regular, and the bony fibres diverge from the natural direction to enter the tumor, as in other forms of eccentric hypertrophy; in the second variety the form is irregular, often fantastic and rough, and there is an evident base by which it is as it were immovably articulated to the supporting bone, except in very old growths; this base in recent cases is cartilaginous and readily separated, and shows that this kind of exostosis originates from and is nourished by the investing periosteum; it indicates also a method of treatment which has been found successful, by denuding them of their periosteum and causing their necrosis and separation from want of nutrition. If the cartilaginous base rests upon the bone, under the periosteum, the removal of this membrane will cause an exfoliation of the subjacent bone; but if between the laminæ of this envelope, a similar operation will effect the fall of the tumor without injury to the surface of the bone; the cartilage soon becomes ossified, and the exostosis forms one body with the bone, resembling the first variety in having no basal line of separation. In course of time the excessive deposit of phosphate of lime in these growths may convert them into a substance having the appearance, consistence, weight, and polish of ivory. Among the constitutional causes of exostosis are syphilitic poisoning, the scrofulous diathesis, and the gouty and rheumatic conditions; but local causes are the most common. These tumors are frequent in domestic animals. All require for their production an irritation or inflammation either of the periosteum or the internal structure of bone; the syphilitic taint generally develops its exostoses from the periosteum, and on bones sparingly covered with soft parts, as the forehead, lower jaw, tibia, sternum, clavicles, and ribs; while the scrofulous constitution favors their origin in the deep-seated portions of the long bones; the superficial exostosis can hardly be developed under a thick mass of frequently contracting muscles. Contusions, local irritations, and wounds of bone, frequently give rise to periosteal exostosis; in some constitutions there is such a disposition to the deposit of ossific matter, that the slightest contusion is sufficient to cause the development of these bony growths, not only on bones but in the substance of tendons and ligaments. An exostosis may grow toward the interior of a bone, and make no appearance externally; when muscles and tendons are displaced or distended, the movements of the joints may be impeded, even to the formation of anchylosis; pressure upon arteries, veins, and nerves may cause œdema, aneurismal tumors, pain, cramp, and partial paralysis. In the upper jaw exostoses often project toward the orbital and the buccal cavities; very common on the lower jaw, they grow sometimes to a large size; on the clavicle they are comparatively rare, but exceedingly common in the pelvic cavity, especially in females. There is nothing in the nature of the growth incompatible with life, the only trouble and danger being from their mechanical action upon neighboring parts. The treatment consists in remedies addressed to the constitutional cause, if there be any; in exciting the absorbents by mercurials, mineral acids, and stimulating applications; in producing artificial necrosis by denuding them of the periosteum; and in removing the tumors by the saw, chisel, trephine, or other instruments.

EXPANSION, the property displayed by bodies of enlarging in bulk by increase of heat, or in a few instances by increase of cold, and also of moisture. It is seen in solids in the common operation of setting the tire of a wheel; the iron ring, being heated in the circle of burning chips and coals arranged upon the ground, enlarges in bulk, so as easily to slip over the felloes, which it pinches closely together, as it

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grows cool on the application of cold water. It is seen in liquids in the rise of mercury in the thermometer; and in aëriform bodies in the ascending currents of heated air, or more plainly in the bursting of a tight bladder, as the air it encloses swells by exposure to heat. The amount of expansion exhibited by different bodies by any given increase of heat is very various. Those only which exist in the aëriform state, or as vapors, can be classed together in this respect. They all expand alike by the same increase of temperature. Like air they increase in bulk from the freezing to the boiling point, so that 100 measures at the lower degree fill 137½ at the higher. For each degree of temperature the expansion is $\frac{1}{480}$. Each solid body has its own rate of expansion, which however is not uniform for equal increments of temperature, but increases at high degrees in a faster ratio. This, unless special allowance is made for it in the graduation, introduces error in thermometers, those marked off in equal divisions for the high degrees evidently not being correct. Another source of error also is in the unequal expansion of the different materials. The mercury from the freezing to the boiling point of water expands 1 in 55.08; between the latter and 392°, 1 in 54.61; and between this and 572°, 1 in 54.01. Glass expands in the same range of temperature, in the first division, $\frac{1}{33333}$; in the 2d, $\frac{1}{33343}$; and in the 3d, $\frac{1}{33378}$. In a mercurial thermometer it is the difference of expansion between the mercury and the glass that is indicated, and the temperature indicated by 586° would correspond to 667° determined by the expansion of glass alone, or to 572° by the air thermometer. Various instruments called pyrometers have been devised to determine high degrees of temperature by the amount of expansion of bars of different metals. They are all approximate only in their results, for the reasons given. Daniell's register pyrometer is the most accurate. (See PYROMETER and THERMOMETER.) The expansions of various bodies from 32° to 212° are presented in the following table:

Names.	Expansion in length.	Expansion in bulk.	Authorities.
Zinc, cast....	1 in 323	....	
" sheet...	1 " 340	1 in 118	Smeaton.
Lead.....	1 " 351	1 " 117	
Tin	1 " 516	1 " 309	Lavoisier and Laplace.
Silver	1 " 524	1 " 175	
Brass.....	1 " 536	1 " 179	
Copper	1 " 582	1 " 194	
Gold	1 " 682	1 " 227	
Bismuth....	1 " 712	1 " 239	Smeaton.
Iron.....	1 " 846	1 " 282	Dulong and Petit.
Antimony ...	1 " 923	1 " 307	Smeaton.
T'mp'r'd steel	1 " 926	1 " 309	Lavoisier and Laplace.
Palladium....	1 " 1,000	1 " 333	Wollaston.
Platinum	1 " 1,181	1 " 377	Dulong and Petit.
Glass, without lead	1 " 1,148	1 " 382	
Flint glass....	1 " 1,248	1 " 416	Lavoisier and Laplace.

The expansion in bulk is thus found to be about 3 times the linear expansion. When metals become liquid by fusion, a change takes place in the law of their expansion; their specific gravity increases, as is shown by solid pieces of a metal always floating upon the surface of a melted mass of the same metal, and on cooling the metal expands. Thus it is that in most castings, the mould is entirely filled in its minutest parts.—A great difference is shown in the amount of expansion of different liquids; thus water gains $\frac{1}{9}$ in bulk when its temperature is raised from 32° to 212°; oil of turpentine $\frac{1}{14}$; and mercury in a glass tube $\frac{1}{5}$. A remarkable exception to the general law of expansion of liquids in proportion as they are heated is shown in the case of water. When this is cooled from the temperature of 60°, it continues to contract until it reaches the temperature of 39.2°. From this point it expands until it freezes at 32°, its rate of expansion being about the same from 39° whether it is heated or cooled. An important beneficial effect resulting from this peculiarity in the expansion of water is seen in the protection it affords to the natural bodies of this fluid, as lakes and ponds, against being frozen throughout. For, as the surface of the water is cooled below 39° by the cold air above, this portion by its expansion becomes specifically lighter than the water below, and consequently remains at the top. At 32° a covering of ice forms over the water, which being a poor conductor of heat preserves the great body of water below from falling to a lower temperature than 39°, the point of its greatest density.—So great a power is exerted by the contraction of metals on cooling after being expanded by heating, that this has been applied as a mechanical force, as in the bringing together of heavy walls of buildings which had separated by unequal settling. Strong iron bars are passed horizontally through the opposite walls, and being heated throughout their length, are closely keyed up and then allowed to cool; and the process is repeated until the desired effect is obtained. This suggests the danger of inserting bars of metal closely in walls of masonry, as by the force exerted by their expansion they tend to thrust portions of the wall out of place. The expansion of water in freezing has been practically applied to the rending of rocks, the fluid being poured into the fissures and allowed to freeze. This is one of the most efficient agents employed by nature for the disintegration of rocky cliffs. The expansion by access of moisture is exhibited in the swelling of the fibre of wood or of ropes. This, too, is sometimes employed as a powerful mechanical force, as by inserting wedges of wood into cracks, or into holes drilled for the purpose in rocks, and then covering the wood with water. As this is absorbed, the wood slowly expands, exerting a steady pressure of surprising force to open the fissure.—The presence of moisture in the atmosphere is ascertained by instruments based on this principle. (See HYGROMETER.) For the effect of expansion of steam, see STEAM.

EXPLOSION, the sudden and violent expansion of a body by its component parts ac-

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quiring a great increase of bulk. In gunpowder this is the result of its elements snddenly entering into new combinations and assnming the gaseons state by the application of heat. As mentioned in the article BLASTING, the bulk is thus instantly increased more than 450 times, supposing the temperature of the gases to be at the freezing point; bnt snch a degree of heat is developed in the chemical changes which take place, that the volnme of the gases is supposed to be from 4,000 to 6,000 times that of the powder. A remarkable feature in these explosions is the immense velocity with which the gases expand; and another is the intense degree of heat produced. Explosions are caused by the sudden formation of steam in considerable quantities, or by the sudden failure of the vessel in which it is confined to longer retain it. By its property of elasticity it instantly assumes a greater volume, breaking from its confinement with the violent movement of an explosion. Electrical explosions are produced by the instantaneous restoration of equilibrium between two bodies differently excited. It is witnessed in its most terrific forms in the stroke of lightning, and in the discharge of the fire balls which are seen at times to burst with tremendous reports in the atmosphere. Liquids thrown in very small quantity upon the surface of molten copper cause most violent explosions, which can hardly be explained by the mere evolntion of the gaseons bodies which the liqnid employed is capable of producing. If melted metal is allowed to flow in moist sand or moulds containing water, explosions are produced which are often attended with serious consequences. They are not of rare occurrence in iron founderies. In these, but more particularly in large blast furnaces, explosions sometimes occur from bodies of inflammable gases collecting in the furnace itself, or in the hot air chambers or flues, or under the boilers, where they are conveyed to be consumed for the heat they prodnce, and where they become mixed with atmospheric air. At one of the large blast furnaces of the Thomas iron company, on the Lehigh river in Pennsylvania, a terrific explosion occurred a few years since from the gas from the lower part of the stack finding its way back into the air receiver and blowing cylinders; and a still more disastrous explosion of the same nature took place at the Hudson iron works on the Hudson river, by which an enormons globe of boiler plate iron, 40 feet in diameter, used for giving regularity to the blast, was blown apart, the upper half of the shell being torn and thrown off with a report that startled the city as if it had been an earthquake. Explosions in the stacks occur in new furnaces not well dried before they are put in blast, and sometimes are repeated at intervals for weeks. A new furnace at Rossie, St. Lawrence co., N. Y., some years since exploded from this canse, throwing out a considerable portion of its contents and setting fire to all that was combustible about it. A most serious explosion occurred at a large blast furnace in Wales some years ago, which was caused by one of the workmen throwing a shovelful of hot coals into the top, when the charges had run very low, preparatory to blowing out. The whole stack was instantly demolished with a tremendous explosion, and 9 men were killed.—The wonderful power developed by the explosion of gunpowder is shown by the experiments of Count Rumford. He loaded a mortar with $\frac{1}{10}$ of an ounce of powder, and closing up every aperture he placed a cannon so as to rest upon the charge with a pressure of 8,081 lbs. On firing, the mortar burst with a loud explosion, raising the cannon upon it. Twenty-eight grains of powder closely confined in a cylindrical space which it jnst filled on exploding burst a bar of iron capable of resistiug a strain of 200 tons. One of the most remarkable gunpowder explosions on record occurred at Wilmington, Del., May 31, 1854. Three wagons from Dupont's mills, loaded with 150 barrels of powder which contained 12,000 lbs., were passing through the town near together. By some means fire was commnnicated to the powder, and the whole blew up. The effects were felt in the buildings for more than a mile around. Some were destroyed; windows in those near by were burst in; in others the nearest windows to the explosion were burst in, and the others out; while in those further off the force was exerted ontward. A wagon tire was torn off the wheel, and a piece left on a hill a quarter of a mile off. Shoes were stripped off the feet of the horses, and in the honses the casters from the furnitnre and the hinges from the doors. Under the wagons depressions were made in the hard macadamized road by a condensation of the earth. The one under the middle wagon measured 10 feet by 5, and was 3 feet deep. Cast iron water pipes 4 or 5 feet below the surface were broken off. The most terrible explosion which ever occurred was that at Brescia in Aug. 1767. In the vaults of the church of St. Nazaire a large quantity of ammunition was stored belonging to the republic of Venice. This was fired by a stroke of lightning, 207,600 lbs. exploding at once, reducing nearly $\frac{1}{3}$ of the city to ruins, and destroying about 3,000 of the inhabitants.—In the explosion of gaseous mixtures, most powerful effects are caused when these produce water by the combination of their elements, as in the mixture of two volnmes of hydrogen with one of oxygen. The vapor generated is rendered extremely rare by the intense heat. By condensing this, and thus prodncing a vacuum, it has been thought practicable to apply explosions to generate mechanical power for useful purposes; and machines have been contrived with this object. In the *Dictionnaire des arts et manufactures* an account is given of an invention of M. Selligue, by which it was proposed to propel vessels through the water by exploding repeated charges of carburetted hydrogen mixed with atmospheric air through two strong tubes

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which were directed through the stern and opened under the water.

EXPONENT (Lat. *exponere*, to manifest), in arithmetic and algebra, a small figure or letter, written to the right of and above a quantity or algebraic term, to show how often the quantity or term must be multiplied by itself. Thus, 3^4 signifies that 4 threes must be multiplied together, and 3^4 is equal to 81; in like manner $(a+b)^4$ signifies that the sum of the numbers represented by a and b must be written down as many times as there are units in c, and then multiplied consecutively into itself. (See ALGEBRA.)—Exponential equations and functions are those in which the exponents contain unknown or variable quantities; such as $y=a^x$, in which a is the only known quantity. Exponential equations are usually reduced to logarithmic, and thus solved.

EXPRESS, a messenger or conveyance sent on any special errand, particularly a courier despatched with important communications. In the United States the word is applied to a system organized for the transportation of merchandise or parcels of any kind. This system was originated March 4, 1839, when, agreeably to announcement published for several days in the newspapers, Mr. William F. Harnden of Boston made a trip from that city to New York as a public messenger. His route was by the Boston and Providence railroad and the Long Island sound steamboat, which connected with that line. He had in charge a few booksellers' bundles and orders, and some brokers' parcels of New York and southern and western bank notes to deliver or exchange—a service for which he charged an adequate compensation. Mr. Harnden proposed also to take the charge of freight, and attend to its early delivery. For this purpose he had made a contract with the above named railroad and steamboat companies. He was to make 4 trips per week. The project recommended itself to business men, especially those whose communications between the two cities were frequent. It was particularly acceptable to the press, to which Mr. Harnden made himself very useful in the voluntary transmission of the latest intelligence, in advance of the mail. A year later (1840) a competing express was started by P. B. Burke and Alvan Adams, the ownership and sole operation of which soon devolved upon the latter. In 1841 Mr. Adams associated with him William B. Dinsmore of Boston as his partner, and gave him the charge of their New York office. Adams and co.'s express was carried by the Norwich and Worcester route. In 1840 Mr. D. Brigham, jr., Harnden's New York agent, became his partner, and soon after went to England, where he laid the foundation of Harnden and co.'s foreign business. He returned in 1841, and in that year their line was extended south as far as Philadelphia, and west to Albany. A year or two later Adams and co. established E. S. Sanford as their agent in Philadelphia, and he became a partner in their business there. He also became associated with S. M. Shoemaker of Baltimore in an express from Philadelphia to Washington, D. C. About the same time Harnden and co.'s Boston, Springfield, and Albany express was purchased by Thompson and co., who gave it their name, which it still bears. About the same period Gay and co., afterward Gay and Kinsley, commenced what is now known as Kinsley and co.'s express, running between New York and Boston, *via* Newport and Fall River. The express lines from Albany to Buffalo, and thence to the remoter west, were established by Henry Wells. The first express west of Buffalo was commenced in April, 1845, by Messrs. Wells, Fargo and Dunning, under the style of Wells and co. It was disposed of, 2 years afterward, to William G. Fargo and William A. Livingston, who continued it, under the style of Livingston and Fargo, until March 18, 1850, when it was consolidated with the expresses of Wells and co., and Butterfield, Wasson, and co. The express line last named had been created about a year previous by John Butterfield. These 3 concerns, when united, were called the "American Express Company." William F. Harnden, the founder of the express business, died in 1848, leaving little or no property. In the mean time numerous short express routes and local expresses had come into successful operation throughout Massachusetts and the rest of New England. Messrs. Pullen, Virgil, and Stone, who by their efficient services had contributed largely to the success of Harnden's business in its infancy, now started an express between New York and Montreal, and laid the foundation of the "National Express Company." Wells, Fargo, and co.'s California express was created in the city of New York in 1852. Adams and co.'s California express, established in 1849, was succeeded in 1855 by that of Freeman and co. In 1854 Adams and co., the Harnden express (then owned by Thompson and Livingston), Kinsley and co., and Hoey and co., were consolidated in a joint stock institution, now famous as the "Adams Express Company." Its stock is in 12,000 shares, of no stated par value, but usually regarded as worth at least $100 per share. The "United States Express Company" was commenced in 1853. It runs a through express twice a day to Buffalo, over the New York and Erie railroad, and thence to numerous western cities, towns, and stations. Between New York and Dunkirk, and at all the stations upon its route, the New York and Erie railroad company is doing an express business which was first established by the regular express company last mentioned. The "Hope Express Company," the "New Jersey Express Company," and the "Howard Express Company," established as joint stock concerns since 1854, were founded upon successful individual enterprises of some years' standing prior to that date. They serve every part of New Jersey and Pennsylvania. The "Eastern Express Company" also is a union of several individual enterprises, consolidated Jan. 1, 1857. Its principal office is in Boston,

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whence its lines diverge by various railroad and steamboat routes into Maine and New Hampshire. Fiske and co., and Cheney, Fiske, and co., are proprietors of expresses which have been very useful, for some years past, in Massachusetts, New Hampshire, and Vermont. Massachusetts is remarkable for the number of its expresses, the most of which have short routes, and are operated by individual enterprise. The "American-European Express and Exchange Company," created in New York, July 1, 1855, was founded upon the business of Livingston and Wells, and Edwards, Sanford, and co. It sends and receives an express by every regular line of foreign steamships, and transacts business in London, Paris, and all the European cities. The American express company does an immense carrying and collecting business throughout the western states and territories. It has offices and agencies in upward of 400 cities and towns. Its joint stock capital, $750,000, is in shares of $100 each, selling, when they find their way into the market, which is seldom, at an advance.—The aggregate capital invested at present in the express business is variously estimated at from $10,000,000 to $15,000,000. It is said to yield from 12 to 14 per cent. per annum to the stockholders. The amount of bank notes and other money transported by the express companies is not less than $10,000,000 per day. They have contracts with the banks for this service, charging from 18 to 30 cents per $1,000, according to the distance, and these prices, in ordinary times, regulate the rates of exchange between the cities of the United States. The expresses travel at the most rapid rate possible, and make the transit of 26,000 miles of railroad twice daily. Every car or train of express freight is accompanied by a messenger, who has also in charge sundry very large trunks, full of small but valuable parcels, and one or more iron boxes or safes, about 18 inches square, containing money for delivery to banks, brokers, and others. To the express agent at each station he delivers what the way bill to that place may call for, and receives freight, &c., to be forwarded from that point to towns further on. All this is done at the station during the ordinary pause made by the express train. Every thing in charge of the express for transportation is entered with the date upon a way bill at the office or station from which it is forwarded. The address of each package is entered in full, and the fare which the express is to receive upon it. If the agent has received it from some other express, or other source, to which he has paid a prior charge upon it, he enters the amount so paid by him in the column of "cash expenses," or charges, and it is put to his credit, and collected, together with the freight, upon the delivery of the package at its destination. If, on the other hand, the freight has been prepaid, the amount is entered in the "prepaid" column. If it has been prepaid to some point beyond the terminus of the express line, or aside from the route, the freight upon it to the nearest station to which the express can convey it is entered in the prepaid column, and the balance of the prepayment is entered in what is called the "paid through" column, to defray the cost of completing its transit to destination. The footings of the prepaid and paid through columns are charged to the agency where the package was billed; the footings of the expense and freight columns to the agent to whom the way bill is sent. Every package is compared with the entry in the way bill by the agent receiving it, and if correct, it is checked off; if wrong, information of the error is sent to the proper source. If it consists of an erroneous charge, the receiving agent charges it back in his way bill to the office where it was made. Thus the mistake is speedily rectified. As every agent issuing a way bill keeps a copy of it, the correction of errors is greatly facilitated. The agents file all the way bills received by them, and periodically return them to the main office of the division. The express messengers are great travellers; there is one in the city of New York who has made the transit of 1,500,000 miles during the last 10 years. The express service, in all its departments, gives employment to upward of 5,000 men.

EXTRACTS, in pharmacy, matters obtained by digesting vegetable substances with water, alcohol, ether, or acetic acid, and evaporating the products until they are reduced to a pasty or sometimes hard and dry consistence. In some instances, as in succulent and green vegetable matter, the active principle which it is desired to obtain is separated by expressing the juices of the plant. These are then evaporated to the proper consistence. Before pressing, the substances are also sometimes mixed with the fluid selected for the solution and allowed to stand for some hours. In selecting a suitable menstruum in which to procure the principles of the plant, reference is had to the nature of these; if they are gums or starch which may be taken up by water, the cheap fluid is employed, and the resins which are soluble only in alcohol or ether are left behind. But if it be the resins or the volatile oils which it is desirable to obtain, alcohol or ether is employed to separate these, and the gums, starch, &c., which are soluble only in water, do not pass with the matters soluble in alcohol through the filter. Various methods are adopted to effect solutions of vegetable principles, so as to obtain their full strength without endangering their decomposition by exposure to too great heat. It was the opinion of Orfila, from numerous experiments upon extracts, that their virtues diminish in proportion to the degree of heat to which they are exposed. The method by hot infusion is consequently adopted, and that also of maceration. By the latter, plants are left with alcohol a week or more at a time, and the process is sometimes hastened by digestion at a moderate heat. An excellent method of obtaining concentrated extracts with cold liquids has been introduced by

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the French, and is called by them the method of displacement, for which the name percolating process might well be substituted. It is the principle of lixiviation exhibited in the common mode of extracting the lye from wood ashes for making soap. A quantity of water poured into the cask upon the ashes becomes saturated with the potash; and if more water is afterward added, the first portion is not weakened by its mixing with it, but the strong liquor is displaced on the passage for its exit being opened under the filtering material in the bottom of the cask. The second body of water, allowed to stand in the same way, acquires much less strength; and the third still less. Cylindrical vessels of tin and of queensware or glass are now used for obtaining vegetable extracts on this plan. They terminate below in the form of a funnel, and where the cylinder begins to contract into this shape, a colander is accurately fitted. On this is placed some cotton or tow, and then the vessel is nearly filled with the vegetable substance, which has been first ground to powder in a mill. Water, ether, or some other liquid is then gradually added until the powder is saturated with it, the escape through the funnel being stopped by a plug or stopcock in the lower end as long as may be desired. The powder may be covered with a second colander or diaphragm pierced with holes, and upon this successive portions of water may be poured, filling the cylinder. It is important that this should be kept constantly full. By making the top of the cylinder air-tight and introducing a tube, any amount of pressure may be obtained, according to the height to which this is extended. In evaporating the solution after this is obtained, the same care is required to avoid too high a degree of heat; and in some instances, too, access of air has an injurious effect, and is consequently to be guarded against. Though concentration by boiling is the common method adopted, and the liquid is for greater safety heated by steam pipes, it is readily seen that evaporation conducted under the receiver of an air pump, as in the vacuum pans used in sugar refineries, is a far better method, the process going on at a very low temperature, and without exposure to currents of air. It is even found expedient in some cases to make use of a surface of sulphuric acid in the exhausted receiver for absorbing the vapors as they are formed, that their elastic force may not act like atmospheric pressure to check their evolution. (See EVAPORATION.) The most perfect processes are thus conducted in the United States upon a very extended scale, and the result is a great improvement in the quality of the extracts, and particularly in their uniformity. The evaporation is continued until the extract is procured in a thick pasty state suitable for being made into pills; or in other cases it is carried on till the product is thoroughly dried. The vapors are sometimes condensed and the liquid applied again to the same uses. Extracts should be carefully protected from the air; and when applied to use, it may be in the form of pills, dry powder, or tinctures, prepared by dissolving in alcohol or some other proper solvent.—EXTRACTIVE, or EXTRACTIVE MATTER, is the name given to a brownish substance, which forms in evaporating vegetable solutions by a portion of the vegetable matter absorbing oxygen from the air and becoming insoluble in water. It gives a brownish color to the water with which it is mixed, and appears to be similar in its properties to the humine or ulmine of the different chemists. Berzelius proposed for it the name apotheme, meaning deposit. It is used as a basis for brown dyes, and combines with the mordant alumina.

EXTRACTION OF ROOTS, in arithmetic, the process of finding a number which multiplied by itself a given number of times will produce the given number. The first root is the number itself, the 2d root requires to be multiplied once by itself, the 3d root twice, &c. Thus the 2d root of 4,096 is 64, the 3d root is 16, the 4th root is 8, the 6th is 4, the 12th is 2. The 2d root is called the square root, because it expresses the linear side of a square whose superficies is expressed by the original number; and the 3d root is called the cube root, because it expresses the linear side of a cube whose solidity is expressed by the original number. Thus 4,096 cubic inches would be contained in a cube of 16 inches; and 4,096 square inches in a square of 64 inches. Roots are most easily extracted by means of logarithms. (See LOGARITHMS.)

EXTREME UNCTION, a sacrament of the Roman Catholic church, administered to persons in danger of death, and held by that church to have the effect of absolving from sin, infusing grace, strengthening against temptation, and sometimes restoring bodily health. It is administered by a priest, who, while repeating the prescribed form of words, anoints the eyes, ears, nostrils, lips, hands, feet, and in some places the breast of the sick person with oil blessed for the purpose by the bishop every year on the Thursday before Easter.

EXUVIÆ, a Latin word used in natural history to designate the cast-off coverings of animals, as the outer skins periodically shed by many reptiles, the shelly coverings of crustaceous animals, as the lobster and the crab, and the integuments frequently cast off by insects. In the case of the toad, the exuviæ are rarely seen from the fact that the animal, as soon as he has succeeded in freeing himself from the old skin, rolls this into a little ball, and instantly swallows it. The process of casting off the covering that has served its purpose is with most of the animals an operation requiring much effort, and attended with no little discomfort. The snake, when the old cuticle becomes dead, and begins to loosen at the head, is partially blinded by its opacity. He becomes sluggish in his movements, and often rubs the sides of his mouth against hard bodies; and when at last the skin is sufficiently detached to be stripped off, and the

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part around the mouth is started back, he coils the posterior portion of the body about the head in front of the old skin, and tightening the coil presses the skin backward, turning it inside out, until, as the coil unwinds by running out toward the tail, the whole body is freed from its covering. The lobster and crab in casting their shells, which they do for the most part annually, are exposed to great danger until the new one is formed. They skulk in retired places, only venturing out when the pangs of hunger compel them to seek for food. The operation must of necessity be a very difficult one, the portion of the body contained in the claws being drawn out so as to leave the shells of these complete and attached to the shell of the body. It is said that the lobster pines before casting till the flesh of the claws wastes away, and is no larger than a goose quill. The cast-off feathers of birds and the hair shed by other animals, as also the scarf skin of man, are exuviæ. In geology, the term is applied to all fossil remains of animals, as shells, bones, &c.

EYALET, a word of Arabic origin, applied by the Turks to the great administrative divisions of the empire, governed by pashas who are termed *vali* or viceroys. Each eyalet is subdivided into *livas* or *sandjaks*, under the rule of kaimakans (lieutenant-governors), and these again into *cazas* or districts. Beside the tributary provinces of Wallachia, Moldavia, and Servia, which form 3 eyalets, European Turkey is divided into 15 eyalets, Asiatic Turkey into 18, and the provinces in Africa into 3.

EYCK, HUBERT AND JAN VAN, the founders of the Flemish school of painting, born at Maaseyk, in the bishopric of Liége, Hubert in 1366, and Jan about 1370. The taste for painting was hereditary in the family, their father having practised the art. The two young men removed to Bruges (whence Jan is frequently called Jan van Brugge), with a view of improving their skill, that town being at the time the great focus of the wealth and activity of the Low Countries. After transferring their residence from Bruges to Ghent, the two brothers were employed in the execution of an altarpiece with folding doors, in the church of St. Bavon at Ghent. Hubert died in 1426, before the completion of this work, and Margaret their sister, who also excelled as a painter, followed him soon to the grave. Jan, after having finished the painting in 1432, returned with his wife to Bruges. He died about 1445, but the accounts of the personal history of the family are conflicting. As far, however, as the artistic achievements of Jan van Eyck are concerned, records of history and of art are unanimous in his praise. Alexander von Humboldt says in his "Cosmos:" "The historical paintings of the brothers Van Eyck present us with the first instances of carefully executed landscapes. Neither of them ever visited Italy, but the younger brother Jan enjoyed the opportunity of seeing the vegetation of southern Europe, where in the year 1428 he accompanied the embassy which Philip the Good, duke of Burgundy, sent to Lisbon, when he sued for the hand of the daughter of King John I. of Portugal. In the museum of Berlin are preserved the wings of the famous picture which the above-named celebrated painters—the actual founders of the great Flemish school—executed for the cathedral at Ghent. On these wings, which represent holy hermits and pilgrims, Jan van Eyck has embellished the landscape with orange and date trees and cypresses, which, from their extreme truth to nature, impart a solemn and imposing character to the other dark masses in the picture. One feels, on looking at this painting, that the artist must himself have received the impression of a vegetation fanned by gentle breezes. In considering the master-works of the brothers Van Eyck we have not advanced beyond the first half of the 15th century, when the more highly perfected style of oil painting, which was only just beginning to replace painting in distemper, had already attained to a high degree of technical perfection. The taste for a vivid representation of natural forms was awakened, and if we would trace the gradual extension and elevation of this feeling for nature, we must bear in mind that Antonio di Messina, a pupil of the brothers Van Eyck, transplated the predilection for landscape painting to Venice, and that the pictures of the Van Eyck school exercised a similar action in Florence on Domenico Ghirlandaio and other masters." Apart from the great share of Jan van Eyck in the introduction of oil painting, he rendered invaluable services to the art by his improvements in linear and aërial perspective, and in painting upon glass. In his early efforts we find him adhering to the customary flat gold ground for the background of the picture; but as he advanced in his art, he adopted the more natural grouping, and a natural background. In the art of painting on glass, he is looked upon as the author of the mode of painting on whole panes with colors delicately blended, and yet so strongly fixed that obliteration was almost impossible—an object before accomplished only by joining together in mosaic several panes of small size, and of different colors. The faults of his style arose from the delicacy which prevented the study of the naked form; hence we find the extremities of the human body, and other parts where anatomical knowlege is requisite, frequently defective. Jan van Eyck's masterpiece is the principal picture in the altarpiece originally intended for the church of Ghent, representing the "Adoration of the Lamb," as described by St. John in the Revelation. This great composition, which contains over 300 figures, was removed to the Louvre, but is now divided, the 6 most important wings being in the royal museum of Berlin, another part in Paris, and part in the cathedral of St. Bavon at Ghent. Philip II. of Spain, disappointed in his desire to purchase the work, employed Michael Coxcie to copy it. Part of one of his copies is now in Berlin, and a part in the Pinakothek at Munich,

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and there is a copy of the whole in London. A picture painted by Jan van Eyck in 1436 after the death of his brother, representing the Virgin and Infant, is preserved in the sacristy of the cathedral at Bruges. The other works of this artist, and of his school, are most abundant in the various collections of that town, in Ghent, Antwerp, Berlin, Munich, Paris, Brussels, Dresden, and Vienna. Michelet says in his "History of France" that Philip the Good showed Van Eyck to foreign nations, as Philip IV. used to display Rubens, by sending him on embassies. Waagen published at Breslau, in 1822, *Ueber Hubert und Jan van Eyck*. The best source of information on the subject in English is the "Early Flemish Painters," by Crowe and Cavalcaselle (London, 1856).

EYE, the organ of the special sense of vision, lodged in man in a cavity on each side of the upper portion of the face, called the orbit. The orbits have the form of a quadrangular pyramid whose base is in front and its summit behind; their direction is horizontal, and their axes, directed backward and inward, would cross at or near the sella turcica of the sphenoid bone in the cranial cavity. They have 4 triangular surfaces, the upper formed by the orbital plate of the frontal and the lesser wing of the sphenoid bone; the lower by the palate behind, the upper maxillary in the middle, and the malar in front; the external by the sphenoid behind and the malar in front; the internal by the sphenoid behind, the ethmoid in the middle, and the lachrymal bone in front. This cavity has at its upper external portion a depression for the gland which secretes the tears, at its inner portion the commencement of the bony passage to the nose; at the summit is the round opening for the entrance of the optic nerve, the union of the sphenoidal, spheno-maxillary, and pterygo-maxillary fissures, and the commencement of the suborbital canal. Beside these bony enclosing cavities, the eyes are protected from dust and foreign bodies by the hairs of the eyebrows above, and in front by the movable lids, fringed with silken lashes. The globe of the eye is of a generally spherical shape, the anterior 5th being the segment of a circle smaller than that of the rest of the organ; the antero-posterior diameter, greater than the transverse, is 10 or 11 lines; differing from the axes of the orbits, the axes of the eyes are parallel. In front, the globe of the eye is in relation with the reflection of the mucous membrane of the lids; behind and all around, with the muscles, vessels, nerves, and a cushion of soft fat. The eye is composed of membranes and humors. Of the membranes of the eye the cornea has already been described under its own title; the others are the sclerotic, choroid, ciliary processes, iris, and retina. The sclerotic is the external membrane, forming the posterior $\frac{4}{5}$, the anterior 5th being formed by the cornea; it is white, firm, and resisting, opaque, thick, and composed of interlaced fibres. Beneath the sclerotic is the choroid, composed of small arteries and veins united by delicate areolar tissue; it extends from the entrance of the optic nerve forward to the ciliary circle; both its surfaces are covered with a dark pigment, which gives the deep color seen in the interior of the eye. The ciliary circle or ligament is a grayish ring, a line or two wide, united by its larger circumference to the choroid, and by its lesser to the iris; the ciliary processes are membranous folds, 60 to 80 in number, extending from the choroid to the neighborhood of the opening of the pupil; they form by their union a ring behind the iris and in front of the vitreous humor, surrounding the crystalline lens like a crown. At a short distance behind the cornea is the circular, vertical, membranous curtain, the iris, pierced in the middle by the pupil; this curtain hangs in the aqueous humor, separating it into the anterior and posterior chambers of the eye; it presents anteriorly a great number of radiations converging toward the pupil, the muscular fibres for the dilatation of this opening, and is variously colored in different individuals; the posterior surface has a number of circular fibres for contracting the pupil, and is covered with a thick dark pigment layer called *uvea;* both surfaces are lined with the delicate membrane of the aqueous humor; the greater circumference is connected with the ciliary ligament and processes; its movements are doubtless partly owing to its erectile and vascular tissue. Beneath the choroid is the retina, a thin soft expansion of the optic nerve, surrounding the vitreous humor and extending forward as far as the ciliary processes and crystalline lens; about 2 lines to the outside of the tubercle of the nerve it presents a circular dark spot and a small perforation discovered by Sömmering; this is the immediate organ of vision, which receives the rays of light and transmits the visual impressions by the optic nerve to the sensorium. Of the humors of the eye, the crystalline lens has been described under that head; the others are the aqueous and vitreous humors. The aqueous humor is a limpid transparent fluid, varying in quantity from 4 to 6 grains, occupying the space in front of the lens which is divided into anterior and posterior chambers by the iris; it contains in solution a little albumen and the salts usually found in such secretions, for it is a secretion of the enclosing membrane; when lost by accident or in the operation for cataract by extraction, it is speedily formed again. The vitreous humor occupies the posterior $\frac{4}{5}$ of the globe of the eye, having the lens encased in its anterior portion; it consists of a transparent, gelatinous fluid enclosed in a great number of cells formed by the partitions of the hyaloid membrane, communicating with each other; in the operation for cataract by depression the lens is pushed backward and downward into this humor. The optic nerves are the 2d pair of cerebral nerves. The globe of the eye is moved by 6 muscles, arising from the contour of the optic foramen and its vicinity, and attached to the sclerotic coat; of these muscles 4 are straight, called the external, internal, supe-

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rior, and inferior *rectus* muscles, moving the eye respectively outward, inward, upward, and downward; the first 2 are often permanently contracted, producing divergent or convergent strabismus, a deformity curable by the division of the contracted muscles, a simple and comparatively painless and bloodless operation; the superior oblique muscle passes through a pulley in the inner portion of the orbital process of the frontal bone, from which it extends to the posterior and external part of the globe, rotating the organ inward and forward; the inferior oblique passes from the internal and anterior part of the floor of the orbit to the external and posterior surface of the globe, rotating the eye outward and upward. The conjunctiva, the mucous membrane of the eye, is reflected from the lids and covers the anterior portion of the globe; it is in this membrane that the redness and swelling of ordinary ophthalmia have their seat. The eye is frequently destroyed by accident or disease; in cases of removal of the organ artificial eyes are used to remedy the deformity; these are made of glass and enamel, and when having the natural size, shape, coloration of iris, form of pupil, projection of cornea, tint of sclerotic, and vascularity, it is often very difficult to detect the real from the artificial organ, especially when the accurate fitting of the latter allows it to be moved by the muscles acting in sympathy with the sound eye.—Without here treating of the laws of refraction, of the aberration of sphericity, and of other optical principles involved in vision, it will be sufficient to say that the rays from an object are first modified by the convex cornea, pass across the aqueous humor through the pupil-opening of the iris, thence through the dense crystalline lens and the vitreous humor, and are by these media of different densities and shapes converged at the proper focal distance on the retina. All rays beyond those necessary for perfect vision are absorbed by the pigment layer of the choroid, which answers the purpose of the black interior of optical instruments; the iris, like the telescopic diaphragm, shuts off the rays from the circumference of the lens, thus correcting the aberration of sphericity, contracting or dilating the pupil according to the brilliancy or dimness of the illumination of the object, or its distance from the eye; it is well known that the pupil of a cat in a bright light becomes diminished to a vertical slit. As the rays are crossed in the lens, an inverted image is formed on the retina, though the mental perception is of an erect image. Not only spherical but chromatic aberration is corrected sufficiently for all practical purposes in healthy eyes by the different refractive powers of the media and by the different curves of their surfaces, so that the image on the retina is well defined and free from false colors. The power by which the eye adapts itself instantly to great variations in the distances of objects is supposed to depend on a change of place in the crystalline lens, by the action of the ciliary processes and muscle which radiates from the ciliary ligament; the reasons for this belief have been given in the article Crystalline Lens. The physiology and defects of vision will be more properly treated in the article Vision; for recent observations by Kölliker on the structure of the different layers of the retina, the reader is referred to the works of Dr. Carpenter on the principles of human and comparative physiology. The pupil is diminished by the action of muscles deriving their nervous influence from the 3d pair, but is dilated through the influence of the cervical portion of the sympathetic nerve. The movements of the eyeballs, whenever voluntary, are always harmonious, but not necessarily symmetrical; though one eye cannot be elevated and the other depressed at the same time, one may be turned outward and the other inward when the axes of the eyes are turned toward an object on either side of the head. The muscles of the eyeball are moved principally through the 3d pair of nerves, the *motores oculorum*, but the superior oblique have special nerves, the 4th pair, and the external recti the 6th pair; the sensibility of the eye is derived from the ophthalmic branch of the 5th pair; by the ophthalmic or ciliary ganglion the sensory branches of the 5th pair, the motor branches of the 3d pair, and the sympathetic filaments are united together. The vascular supply of the globe of the eye is derived from the ophthalmic branch of the internal carotid artery.—The complicated eye of the mammal and bird becomes more simple in reptiles and fishes, losing the eyelids, and in the articulates generally losing all that is anterior to the vertebrate crystalline lens, as well as mobility, the latter loss being supplied by the multiplication of the organs or facets. The mammalian eye is constructed to suit the circumstances of the life of the animal; of large size in ruminants and rodents, it is small in moles, bats, and cetaceans, and in the latter flattened anteriorly as in fish; they are generally placed laterally, but in the nocturnal species they are directed forward as in man; the lachrymal caruncle at the inner angle has in man only a rudiment of a nictitating membrane, which is more developed in some mammals, but remarkably in birds; the sclerotic is thicker in animals whose eyes vary much from a sphere, especially posteriorly, this membrane in a whale with an eye of the size of an orange being an inch thick behind; the choroid, dark in man, in the carnivora, ruminants, and other orders, reflects vivid metallic colors, remarkably brilliant at night, from the depths of the organ. In animals and man destitute of the usual coloring matter of the surface, or in albinos, the iris is pink, from the color of the blood circulating in its vessels; during fœtal life, until just before birth, the pupil is closed by a membrane. The foramen of Sömmering is said not to exist in any mammals below the quadrumana; the tear gland is found in all except cetacea. In birds the sclerotic becomes more or less strengthened

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by cartilage, and in the neighborhood of the cornea is provided with a series of bony plates, arranged in a circle, and overlapping each other; but the chief peculiarity consists in the *pecten*, folded like a comb or fan, and projected forward toward the lens; it is vascular like the choroid, though not connected with it, and is dark with pigment; its use is not satisfactorily ascertained, but it is regarded by Owen as destined to push forward the lens by its erectile tissue; others suppose that its purpose is to absorb superfluous rays of light. Many species of reptiles have osseous pieces in the sclerotic; snakes have no movable lids; the chameleon has a single circular lid. In fishes the eyes are generally large, the sclerotic thick, and in some (as the tunny) osseous anteriorly; they have neither lids, except the most rudimentary, nor lachrymal glands; the cornea is very flat, and the lens dense; around the entrance of the optic nerve there is a very vascular, horse-shoe shaped organ, between the layers of the choroid, called the choroid gland or muscle; this probably pushes the retina toward the lens by its vascular erectility, and perhaps by muscular action, in the adaptation of the organ for vision at different distances. The organs of vision in insects consist of simple or of compound eyes, the first occurring chiefly in larvæ, the latter in perfect insects; they are wholly absent in some larvæ, and both forms coexist in the perfect state of many. The simple eyes (*ocelli* or *stemmata*) consist of a convex cornea, behind which is a lens, lodged in an expansion of the optic nerve, and surrounded by a variously colored pigment layer; they vary in number from 2 to more than 100, and are situated on the head. The compound eyes are made up of simple eyes so closely placed that their facets or corneæ are contiguous; behind each cornea is a transparent pyramid whose interior apex is received into a kind of vitreous body, surrounded by the nerve and the choroid; there are sometimes many thousand facets in these eyes, which may cover nearly the whole head, and hairs may project at their angles. In the arachnids the eyes are simple, and the orders have been characterized by their number, situation, and direction; they are most numerous in the scorpions. The sense of sight is present in almost all crustacea; their simple eyes consist of a cornea with a lens and pigment layer; a usual form is that of many simple eyes, placed close together, and covered by a common cornea; sometimes there is a facetted cornea under the simple one; the highest forms have compound facetted eyes, in many situated at or near the end of 2 peduncles movably articulated to the cephalo-thorax and concealed in special fossæ; these facets are very numerous, and behind each is the usual lens and pigment. The eyes of cephalopods are very large and highly developed, resembling in some respects the vertebrate organ; there is generally an ocular bulb, and a capsule constituted by a cartilaginous orbit and a fibrous continuation of the cutaneous envelope, which takes the place of a cornea; semilunar folds containing muscular fibres cover the eye like lids; in front of the globe is a space analogous to an anterior chamber, containing a serous fluid, and in the octopods communicating externally; internally this chamber is closed by a kind of pupil; its serous membrane has a silvery lustre; in some species the lens is in direct contact with the water in which they swim; there is an iris, sclerotic, vitreous liquid, a spherical brownish lens formed of concentric layers, a ciliary body, and pigment layer; in the nautilus the eyes are placed on a projecting stalk, but in others are generally deeply sunk in the head. In the cephalophora (including pteropoda, heteropoda, and gasteropodous mollusks) eyes are generally present, never more than 2 in number and comparatively small; they are almost always connected with the tentacles, either at their base, sides, or extremities. In acephalous mollusks, eyes are very common and numerous, occupying the borders of the mantle or confined to the orifices of the tubes, and are either pedunculated or sessile. In the annelids the eyes are generally either wanting entirely, or are merely able to distinguish light from darkness; but the leeches have from 2 to 10 undoubted eyes. In the helminths there appear to be no eyes, only pigment spots containing no light-refracting body. Below these are found in the radiata various eye specks and pigment dots which doubtless in some cases are true eyes, but anthors are not yet agreed as to the light-refracting powers of most of these organs. The eye of the blind fish of the Mammoth cave, Kentucky, though unable to form a distinct image, can doubtless distinguish light from darkness through the areolar tissue and skin which cover it; Prof. J. Wyman has found in it a lens, sclerotic, choroid, retina, and optic nerve, and it is therefore constructed on the vertebrate plan, rather than the invertebrate to which it has generally been compared; the parts in connection with the nervous system are developed, while those which are formed by inversion of the integuments are mostly absent; some authors are of opinion that the stimulus of light for several generations would retransform this eye into an ordinary organ of vision.

EYE STONE, the operculum or calcareous mouth-piece of certain species of small univalve shells. The stony-like substance, of ¼ inch or less in its largest dimensions, presents a form like that of a turtle, a convex surface upon a plane base; and being placed on a smooth plate in a weak acid, as lemon juice, the evolution of carbonic acid gas from the carbonate of lime, of which it is composed, lifts it up and causes the stone to move about as if alive. A similar effect resulting from chemical decomposition is sometimes observed in animal bodies (see DEATH); and loaves of bread, Humboldt remarks, have been observed to move in like manner in the oven, whence the ovens have been called enchanted. He found the little opercula, called *piedras de los ojos*, or eye stones, regarded as great mysteries by the inhabitants

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of the coast of Venezuela near Cumana. They collected them in great quantities on the beach at Cape Araya, and made use of them to extract dust or any foreign substance from the eye, a purpose for which they are still collected and exported, and are kept by druggists. Being introduced under the lid of the eye, the stone moves about by the motion of the organ, and any little particles it comes in contact with adhere to it and are finally removed with it.

EYES, a term used in gardening to signify the axillary buds in plants. At the origin of the leaf with the stem or branch, the cellular tissue becomes filled with an intenser vitality, and a new set of foliar organs is formed for a future increase, generally for the succeeding season. These aggregations of young leaves around a new and common axis, and enveloped in modified leaflets called scales, constitute the eyes of the plant; and they are selected, when ripened sufficiently, to serve the same purpose as seeds in rearing new individuals, or in the operation of engrafting by the process of inoculation upon some kindred plant. In the exogens every new leaf sends down its woody fibres into the alburnum; and a similar process is perceived in the facility with which certain leaves, as those of the *gloxinia*, *hoya*, &c., emit roots, when they are separated from the plants and inserted in the soil. By such an arrangement in nature, a new axis or stem is created between the end of the petiole or leaf stalk and the tops of the newly formed roots, and presently a leaf bud is formed at the place of junction. In the same manner the ripened leaf bud or eye, detached from the branch, can be used for propagation, by cutting out the eye with a very sharp knife, reserving a piece of wood and bark as a sort of shield, and then planting it in properly prepared soil. To facilitate the operation, it is found better to have some gentle heat applied beneath; and the eyes of many kinds of plants thus set in a moderate hot-bed take root readily in a few days or weeks. In this way the rarest kinds of the grape can be reproduced, the new plants retaining all the peculiar virtues of the parent stock; whereas if their seeds had been sown, a most varied progeny would have appeared. Some gardeners prefer this mode of propagation by eyes to that of layering or of cuttings, averring that the stem of the newly formed plant is handsomer, straighter, and every way better. It has been found that exotic grapes root more easily from eyes than do our native species and varieties, probably because the wood of the latter is harder and firmer, or has more pith in proportion to the size of the stem. There seems to be no natural impediment to rearing any kind of plant from eyes if the requisite conditions can be discovered. Even the potato crop in some parts of Great Britain is entirely raised from eyes, and advantage is taken of the position of the eyes upon the root to secure early and successive crops. Thus it has been ascertained that eyes cut from the extremity of the potato will mature the soonest, those from the middle part next, and those from the butt or end next the root will come to maturity last. Here the same phenomenon organically exists in the fact that the potato tuber is really an enlarged subterranean stem, and one part of it matures its buds sooner than the others; so that the more mature and more dormant the eye may be at the time of selecting it for propagation, the surer and speedier the development under favorable circumstances. Certain abortive branches, called knaurs, often appear on the olive, beech, poplar, cedar, and many other trees, which, possessing the nature of eyes, can be employed for propagation; and similar excrescences have occurred upon the horse-shoe geranium (*pelargonium zonale*), from which plants have easily been reared.

EYLAU, or EILAU, a town of Prussia, 26 m. S. S. E. from Königsberg, on the Pasmar; pop. 2,900. It is surrounded by lakes, contains an old castle, and has manufactories of cloth, hats, and leather. Here on Feb. 7 and 8, 1807, was fought a battle between the French under Napoleon, 85,000 strong with 350 guns, and the Russians and Prussians, 75,000 strong with 460 pieces of artillery. About 50,000 men perished, and both sides claimed the victory. In this battle Napoleon was nearly made prisoner by a Russian division, but was saved by his own presence of mind and the heroism of his little body guard of 100 men.

EZEKIEL (Heb., whom God strengthens), a son of Buzi, the 3d of the great Hebrew prophets, and contemporary with Jeremiah and Daniel, lived in the 7th and 6th centuries B. C. He was still young when he went into captivity with the nobility of the land, who followed King Jehoiachin to Babylon. There, on the banks of the Chebar, supposed to be the Chaboras in Mesopotamia, in the 5th year of his exile, he began his prophetic career by a vision which singularly contrasts with the majestic simplicity of that of Isaiah. He declared to his fellow exiles the misfortunes which were besetting and threatening Jerusalem and the country of Judah. At times he found words of consolation, and yielded himself to hopes of a better future. In the 25th year of his exile he prophetically described the new temple which was to rise in Jerusalem after the redemption of his people. This is one of the last prophecies remaining from him, and there is no account of him beyond the 27th year of the captivity of Jehoiachin. According to a doubtful tradition he was assassinated by one of the exiled princes, and during the middle ages his tomb was pointed out between the Euphrates and the Chebar, and was the goal of many pilgrimages by Persian Jews. More than any other Old Testament writer Ezekiel deals in visions and symbols. He never wearies of adding poetical and minute details, and of drawing out images into allegories. The same genius predominates through the entire book which bears his name, which is occupied with prophecies concerning both Jews and Gentiles. Many

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of the visions, especially those of the first chapter, seemed to the early rabbis so obscure, that they forbade the Jewish youth to read them till they had attained the age of 30 years.

EZRA, a celebrated Jewish scribe and priest, lineally descended from Aaron, and, according to Josephus, high priest of the Jews who were left in Babylon. Under his guidance, the second expedition of the Jews proceeded from Babylon to Palestine, under the reign of Artaxerxes I., about 458 B. C. The important services rendered by Ezra to his countrymen on that occasion, and also in arranging and settling the canon of Scripture, are specially acknowledged by the Jews, so that he is counted among the most eminent of the servants of God, and even regarded as the second founder of the nation. Josephus states that Ezra died at Jerusalem, and was buried there with great magnificence; according to others, he returned to Babylon and died there, at the age of 120 years. Ezra is said by some of the rabbis to have introduced the present square Hebrew characters, and, in conjunction with some of the elders, to have made the Masora, the punctuation and accentuation of the Bible. Beside the book of Ezra, this eminent priest and scribe was supposed to have been the author of the two books of Chronicles, and some writers attribute to him also the books of Nehemiah and Esther, though they differ in style from his acknowledged writings. The book of Ezra contains an account of the favors bestowed upon the Jews by the Persian kings, the rebuilding of the temple, the mission of Ezra to Jerusalem, and the various regulations and reforms introduced by him. In ancient manuscripts there are 4 books of Ezra, viz., the one just spoken of, the book of Nehemiah, and the 2 books which in the English version are called 1st and 2d Esdras, and placed among the apocryphal books.

EZZELINO. See GHIBELLINES.

F

F, the 6th letter of the English and Latin, the 20th of the Arabic, and the 23d of the Persian alphabet, indicates a labio-dental sound, produced by the passage of the expired air between the lower lip and the upper incisive teeth, while the glottis and larynx are almost at rest. Quintilian calls this sound "scarcely human," since it is a mere afflatus, and is wrongly placed among the semi-vocals. Its sonorous parallel is the softer sound of V (as in English), in producing which the glottis and larynx are engaged. F is represented in ancient Greek both by the φ (*ph*) and the digamma, in corresponding words; but the sound of the former was less harsh and rather aspirated than blowing (*efflatus*), and the latter sounded almost like our V. The figure of the Latin F arose from the doubling of the Greek Γ. The emperor Claudius is reported to have used it inverted (ⅎ) to represent V. As a numeral sign for 6, the stigma was employed by the Alexandrines, as one of the 3 *επισημα*, instead of this digamma, which is named *βαν* or *vau*. The shape of the stigma (ϛ) is an inverted Oscic and Umbric F (Ↄ). We find the prototype of our cursive *f* on ancient Hebrew coins; but in the present so called Hebrew, as in the Syriac, Sabæic, Palmyrenic, and some other kindred writings, the *vau* takes the place of F, and indicates the sounds of *v* and *u*. F occurs in the same place also on the Idalian tablet of Cyprus, in Lycian, also in Tuarik (Berber), and in some other writings. In the Cyrillic the *phert* and *phie* (φ) correspond to it as the 27th letter, in Glagolitic (Bukwitsa) as the 23d, and in Russian as the 27th. F is the first Rune, and it is represented hieroglyphically by a horned snake, from which the Coptic *fei* is derived. It is often vicariously converted into other letters or sounds, especially into labials, as in the following examples: Lat. *frater, frango, fagus*, Eng. *brother, break, beech*; Lat. *pes, pugnare, porculus*, Eng. *foot, fight*, Ger. *Ferkel* (little pig); Lat. *ferrum, filius, folium, fugere, formosus, fabulari, fames, furari*, Span. (since the 14th century) *hierro, hijo, hoja, huir, hermoso, hablar, hambre, hurtar*; Lat. *floccus, fons*, Ital. *bioccolo, bonte*; Lat. *fabulari, fame affici, fanum, fodus*, Wallachian *heblĕre, hemisire, han, hed*; Lat. *foris, fagaster*, Fr. *hors, hêtre* (obsolete *haitre*, beech tree). The Greek φ the Italians, Spaniards, and Portuguese uniformly replace by *f*. Compare Macedonian *Bryges, Berenice*, for Φρυγες, Βερενικη, Germ. *Freye* and *St. Veronica; vates, prophetes*, and *fari* (speak); Lat. *vulgus*, Ger. *Volk*, Eng. *folk; Joppa*, Arab. *Jaffa*, &c. A few instances of greater alternations, viz., with gutturals (owing to the affinity of the digamma with the spiritus, and to yet deeper reasons), may suffice: Ger. *Shacht*, Eng. *shaft*; Holland. *achter*, Eng. *after*; Germ. *lichten, leicht*, Eng. *lift*, Lat. *levis*; Germ. *kriechen*, Eng. *creep* and *crafty*. In French, final *f* is mute in some words. In English and French it alternates with *v* in grammatical forms, as *wife, wives; natif, native*. The Greek θ sometimes becomes *f* in Russian, as *Theodoros, Fedor*; Gothic *thliuhan*, Germ. *fliehen*; Gr. θυρα, θερα, Lat. *fores, fera*; Swedish *dofft*, Eng. *dust*, &c. Very peculiar are the transformations of the Latin *fl* (also *pl*) into Spanish *ll* and Portuguese *ch*; as *flamma, llama, chama*, &c. The Devanagari, and most graphic systems of eastern Asia derived from it, have no F. The sound exists in the Chinese and Japanese languages. Most American languages are guttural, and lack the sounds of *f, b, d*, some even *r* and *s*.—As a numeral, Baronius states that F is equivalent to 40, and F̄ to 40,-

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000. It signifies 80 in Arabic, and 10,000 in Armenian. Its substitute *ph* stands for 500 in Russian and Georgian; while the Phœnician, Chaldaic, and Syriac *vau* designated 6. As an abbreviation, F stands for *filius, fecit*, Flavius, Fahrenheit, &c.; for *forte* in music, and *ff* for *fortissimo*. F is marked on the French coins of Angers, on the Prussian of Magdeburg, and on the Austrian of Hall in the Tyrol. In music, it denotes the 4th diatonic interval, or the 6th string on the piano in the chromatic scale, and is called *fa* in the solfeggio.

FABER, Frederic William, D.D., a Roman Catholic priest of the congregation of the Oratory of St. Philip Neri, and a voluminous spiritual writer, born in England, June 28, 1815. After studying at Harrow, he was graduated at Oxford, in 1836, and was elected to a fellowship in University college. After his ordination as a minister of the establishment, he was appointed to the rectorship of Elton in Northamptonshire, a position which he filled with marked ability until his conversion to the Catholic faith, which was formally consummated, Nov. 17, 1845. His published writings up to that time were as follows: "Tracts on the Church and the Prayer Book" (1839); "A Sermon on Education (1840); "The Cherwell Water Lily, and other Poems" (1840); "The Styrian Lake, and other Poems" (1842); "Sights and Thoughts in Foreign Churches" (1842); "Sir Lancelot, a Poem" (1844); "The Rosary and other Poems" (1845); and several papers in the "Lives of the English Saints," published under the editorship of the Rev. Dr. Newman. Immediately after his submission to the Roman church, Dr. Faber began to study and prepare for the reception of holy orders, and was ordained priest in 1847. He had with him several young men who had followed him into the church, and were anxious to devote themselves to the conversion of their countrymen, and for a time he thought of founding a new order under the patronage of St. Wilfred. But he afterward concluded to join his forces with those of Dr. Newman, who had just transplanted the Oratory of St. Philip Neri to England, and in 1848 he received the habit of that congregation. Since that time he has won a high reputation as an earnest and eloquent preacher and writer, and a poet. His spiritual books find many Protestant as well as Catholic readers, and have been translated into several languages. His published writings since his conversion are as follows: "Catholic Hymns," and an "Essay on Beatification and Canonization" (1848); "The Spirit and Genius of St. Philip Neri" (1850); "Catholic Home Missions" (1851); "All for Jesus" (1854); "Growth in Holiness" (1855); "The Blessed Sacrament" (1856); "The Creator and the Creature" (1857); "The Foot of the Cross, or the Sorrows of Mary," "Sir Lancelot" (being his former poem rewritten), and "Ethel's Story Book" (1858); and "Spiritual Conferences" (1859). He is at present superior of the Oratory at Brompton, London.

FABER, George Stanley, an English theological writer, born Oct. 25, 1773, died at Sherburn hospital, near Durham, Jan. 27, 1854. He studied at the university of Oxford, where he became a fellow and tutor of Lincoln college, was appointed Bampton lecturer in 1801, and in the same year published his discourses under the title of *Horæ Mosaicæ* (2d. ed., enlarged, 1818). He took the degree of B.D. in 1803, married, gave up his fellowship, and for 2 years assisted his father, the rector of Calverley in York, as curate. He subsequently occupied various vicarages, in 1831 was made prebendary of Salisbury, and in 1832 appointed to the mastership of Sherburn hospital. He wrote a large number of works, most of which, particularly those on prophecy, in which he holds that the inspired predictions apply not to individuals but to governments and nations, have had a wide popularity. Among the most important are: "Dissertation on the Mysteries of the Cabiri, or the Great Gods of Phœnicia" (2 vols. 8vo., Oxford, 1803); "Dissertation on the Prophecies (2 vols. 8vo., London, 1805; supplement, 1 vol., Stockton, 1806); "Difficulties of Romanism" (8vo., 1826); "Papal Infallibility" (8vo., 1851); "The Revival of the French Emperorship anticipated from the Necessity of Prophecy" (12mo., 1853; new ed., New York, 1859).

FABIUS, the name of one of the most celebrated patrician *gentes* of ancient Rome, which boasted of a lineal descent from Hercules and the daughter of the Arcadian Evander. In the earliest times of the Roman republic we find the *Fabia gens* among the wealthiest and most influential of the noble families of the commonwealth. Thus for 7 consecutive years (485–479 B. C.) members of that family were elected to the consulship. They seem to have been haughty and violently opposed to a democratic form of government. Disgusted by the rising influence of the plebeians, they withdrew with their vassals and followers to the Veientian frontier. There, in a battle fought with the Veientes in 477 near the Cremera, 300 of them with several thousand of their followers were slain. One boy only is said to have remained of the family, and to have become the ancestor of all the illustrious Fabii who subsequently appear in Roman history. Among these, Quintus Fabius Rullianus obtained by his heroic achievements in war the surname of Maximus (the greatest). From 325, in which year he defeated the Samnites in disobedience to the command of a superior officer, and hardly escaped the penalty of death on that account, until 292, his military career was a series of brilliant victories over Samnites, Umbrians, Etruscans, and Gauls. Five times he was elected consul. He was the first Roman general who carried the arms of Rome beyond the Apennine range into the country of the Gauls, whom he defeated at Sentinum, in 296. Many of his exploits, however, have probably been embellished by popular tradition, and perhaps by historians who belonged to

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the Fabia gens.—Livy suggests and Polybius asserts that it was not Q. Fabius Rullianus upon whom the cognomen of Maximus was originally conferred, but his great-grandson Quintus Fabius Maximus Verrucosus, who, by his prudent generalship in the second Punic war, saved the Roman commonwealth from imminent ruin. He had been twice consul (233 and 228), and had given proof of his military talents in a brief war with the Ligurians. But it was only when Hannibal had invaded Italy, and the armies of Rome were melting before him, that Fabius obtained an opportunity to develop his talents to the fullest extent. In 217, after the defeat at Lake Thrasymenus, he was appointed pro-dictator by the people. Perceiving that to oppose to a victorious enemy a newly enlisted and disheartened army would be certain ruin, he wisely resolved upon avoiding all open battles, and to weaken the enemy by tiring him in useless marches and countermarches. Keeping together his little band in a compact body, he moved his camp from highland to highland, where the Numidian horses and the Spanish infantry of Hannibal could not follow him, watched the enemy with unrelaxing vigilance, cut off his stragglers and foragers, and compelled him to weary his allies by heavy exactions. This cautious manœuvring, on account of which he was called *Cunctator* (the cautious, the delaying), was misinterpreted by his own lieutenant Minucius, and, through his representations, by the Roman senate and people, as cowardice or imbecility. The command therefore was divided between Fabius and Minucius; but the latter, advancing rashly against the enemy, was speedily entrapped, and would have been destroyed had not Fabius hastened to his rescue. Then only the masterly inactivity of Fabius began to be appreciated. Though he laid down the dictatorship after the expiration of 6 months, he continued his strategy as consul, and it was imitated by some generals succeeding him for several years; and when, in 216, the consul Terentius Varro once more, heedless of the wise counsels of Fabius, ventured on an open field battle at Cannæ, he was overwhelmingly defeated. In 209 Fabius was elected consul for the 5th time, and in that year recaptured Tarentum from the enemy. During the latter years of the war the more energetic plan of action proposed by Scipio prevailed over the advice of Fabius. Just about the time when Hannibal was leaving Italy Fabius died at an advanced age, 203 B. C.—Caius Fabius Pictor was the earliest Roman painter. In 302 B. C. he painted a battle piece in the temple of Salus. The painting was preserved till the time of the emperor Claudius, when the temple was destroyed by fire.—His son Numerius Fabius Pictor is mentioned by Cicero as an author of Greek annals, but is probably mistaken for his nephew (a grandson of the painter), Quintus Fabius Pictor, the first prose writer of Rome (*scriptorum antiquissimus*), who served in the Gallic war, 225 B. C., as also in the second Punic war. He was the author of a history of Rome from its foundation to his own time. Of this work, which probably was written in Greek and was highly valued by later writers, no fragments remain.

FABRE, François Xavier Pascal, a French painter, born in Montpellier, April 1, 1766, died March 12, 1837. He was a pupil of David, and produced in 1787 a painting representing the "Execution of the Children of Zedekiah by order of Nebuchadnezzar," for which he received the great prize of the academy, and was sent as a pensionary to Rome. He was believed to have been secretly married to the countess of Albany, who on her death in 1824 made him her sole heir, and bequeathed to him valuable MSS. which had been left to her by Alfieri. Fabre gave them to the city of Florence.

FABRE D'ÉGLANTINE, Philippe François Nazaire, a French revolutionist and author, born in Carcassonne, Aude, Dec. 28, 1755, perished on the guillotine at Paris, April 5, 1794. In gratitude for a wild rose of gold (*églantine*) which was awarded to him in early life at the floral games at Toulouse, he adopted that name. He wrote a variety of plays for the theatres of Paris, a few of which, as *Le Philinte de Molière*, *L'intrigue épistolaire*, &c., were favorably received. On the outbreak of the revolution he associated himself with Danton, whose secretary he became in 1792. He was one of the members of the convention, where, however, he played but a secondary part. He was accused of venality, and eventually doomed to share the fate of Danton. While ascending the guillotine his literary fame was foremost in his mind, and he distributed some of his writings among the populace. One of his comedies, *Les précepteurs*, was produced for the first time 5 years after his death, and received with great applause. Two volumes of his writings were published in 1801 under the title of *Œuvres posthumes et mêlées*.

FABRETTI, Raffaello, an Italian antiquary, born in Urbino in 1618, died in Rome in 1700. At the age of 18 he received the degree of doctor, and repaired to Rome, where he made himself profoundly acquainted with the literature and art of the ancients. After filling a diplomatic mission in Spain, he became treasurer of Pope Alexander VII., and under the 3 succeeding popes he held various offices at Rome, Madrid, and Urbino. His first archæological works, entitled *De Aquæductibus Veteris Romæ*, and *De Columna Trajani*, excited a general interest. His interpretation of certain passages of Livy involved him in a violent discussion with Gronovius. In a learned work upon ancient inscriptions he made known the treasures discovered by him in the catacombs of Rome. His rich collection of antiquities is still seen in the ducal palace of Urbino.

FABRIANO, Francesco di Gentile da, an Italian painter of the Roman school, born in Fabriano, in the Papal States, about 1370, died in Rome in 1450. Michel Angelo said that his name Gentile, the noble or delicate, was

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in harmony with the character of his works. In 1417 he painted in the cathedral of Orvieto a Madonna, which still exists, and which was so much admired that the artist received the title of *magister magistrorum*. He then went to Venice, where he obtained great success, and was invited to Rome, where his paintings in the church of St. John of Lateran, which his infirmities did not permit him to finish, made him esteemed the first painter of Italy. His manner resembles that of Fra Angelico. He was the master of Jacopo Bellini.

FABRICIUS, Caius, a Roman statesman, flourished in the 1st quarter of the 3d century B. C. He is celebrated in the history of the republic for his virtue and integrity. While consul in 282 B. C. he defeated the Lucanians, Bruttians, and Samnites, and enriched the public treasury with more than 400 talents from the spoils of the enemy, remaining poor himself. In 280 he served as legate in the campaign against Pyrrhus, king of Epirus, to whom he was sent at its close with an embassy, to ask the ransom or exchange of some Roman prisoners of war. The meeting of the two distinguished men at Tarentum has perhaps been embellished by the historians of Roman antiquity, who seem to dwell with particular fondness on the last examples of olden virtue, in that period of commencing decay. Fabricius is represented to have withstood not only the most splendid offers of the victorious king, who knowing his poverty tried to bribe him into his service, but also the threatening aspect of an elephant seemingly let loose upon him. In reward of his integrity the king allowed the captives to repair to Rome for the celebration of the Saturnalia, on promise of returning after the festival. In 279 Fabricius fought in the battle of Asculum, which, though nominally a victory, was regarded by Pyrrhus himself almost as a defeat. In the next year he commanded again as consul, and exposed to his enemy the treachery of his physician, who offered to poison him, upon which Pyrrhus is said to have exclaimed: "It is easier to turn the sun from its career, than Fabricius from his honesty," and to have freed all his captives without ransom. When Pyrrhus evacuated Italy, Fabricius was engaged in subduing his allies. As censor in 275 he deprived P. Cornelius Rufinus of his seat in the senate, for having in his household 10 pounds weight of silver plate. Like Curius Dentatus, he spurned the presents of the Samnite ambassadors, and died so poor that the senate had to provide marriage portions for his daughters. He was buried within the walls of Rome, the prohibitory law of the 12 tables having been suspended in his honor.

FABRICIUS, Georg, a German scholar, born in Chemnitz, Saxony, April 24, 1516, died in Meissen, July 13, 1571. His edition of Horace (2 vols., Basel, 1555) is still esteemed at the present day. He wrote Latin poetry with great purity, and was so pious that in his sacred poems he would employ no words which had the slightest flavor of paganism, and censured those who had recourse to the pagan divinities to ornament their verses. Baumgarten-Crusius wrote a sketch of his life and writings.

FABRICIUS, or Fabrizio, Girolamo, surnamed from his birthplace Ab Aquapendente, an Italian anatomist and surgeon, born at Acquapendente, in the Papal States, in 1537, died in Padua, May 21, 1619. A most distinguished pupil of Fallopius, he succeeded him as professor of anatomy and surgery at the university of Padua, which position he held for 50 years. His most remarkable discovery was that of the membranous folds (which he called valves) in the interior of veins. Several of them had been observed by Vesalius and other anatomists, but Fabricius was the first to demonstrate in 1574 the presence of these valvular folds in all the veins of the extremities. William Harvey, who was his pupil, acknowledged himself indebted to his teachings for the discovery of the circulation of the blood. His writings comprise dissertations on the formation of the fœtus, the structure of the œsophagus, stomach, and body, and the peculiarities of the eye, ear, and larynx; treatises on the egg and on veins, &c. Great honors were bestowed on him by the Venetian government, and a new and large anatomical theatre was constructed for his accommodation. He left to his niece a fortune of over $150,000, and his beautiful villa on the Brenta is still known under the name of *Montagnuola d'Acquapendente*. The first edition of his surgical works appeared at Padua in 1617. A complete edition of his anatomical and physiological works was published by Bohn in Leipsic in 1687, followed in 1737 by that of Albinus of Leyden, containing a biographical sketch of Fabricius, and the prefaces of the different treatises, which Bohn had suppressed.

FABRICIUS, Johann Albert, a German bibliographer, born in Leipsic, Nov. 11, 1668, died in Hamburg, April 30, 1736. He studied philosophy, medicine, and theology, and in 1713 became librarian to J. F. Mayer at Hamburg. In 1699 he was appointed to the professorship of rhetoric and moral philosophy in the gymnasium of that city, which he retained until his death. The extent of his learning in almost every department of knowledge, especially in philology, was remarkable. His most celebrated works are *Bibliotheca Latina* (Hamburg, 1697; 5th ed. 1721; new edition by Ernesti, Leipsic, 1773–'4); *Bibliotheca Græca* (Hamburg, 1705–'8; continuation and new edition by Harless, 1790–1809, provided with an index in 1838); *Bibliographia Antiquaria* (Hamburg, 1713; new edition by Schafshausen, 1760); *Bibliotheca Ecclesiastica* (Hamburg, 1718); and *Bibliotheca Mediæ et Infimæ Ætatis* (5 vols., Hamburg, 1734; supplementary vol. by Schöttgen, 1746; new edition by Mansi, Padua, 1754).

FABRICIUS, Johann Christian, a Danish entomologist, born in Tondern, Schleswig, Jan. 7, 1743, died in 1807. His academic studies were pursued at Copenhagen, Leyden, Edin-

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burgh, and finally at Upsal, where he enjoyed the instructions of Linnæus. A similarity of tastes and temperament brought master and pupil into the closest intimacy, and to Fabricius we are perhaps indebted for the most interesting biographical notices of the great Swede. No pupil of Linnæus has more thoroughly applied his method, and even his forms of expression, to the development of a special branch of science, and none has enjoyed a more brilliant reputation. It was during a scientific excursion with Linnæus that the idea of classifying insects according to the formation of the parts which constitute the mouth first occurred to him; and the approval and encouragement of his master, to whom he explained his views, gave the first impulse to his entomological studies, and to the development of the system of classification with which the name of Fabricius is now identified. Linnæus himself declined to apply the system to his new edition of the *Systema Naturæ*, only because he conceived himself too old to change his method. In 1768 Fabricius took the degree of doctor of medicine, and soon after was appointed professor of natural history in the university of Kiel, where he published in 1775 his *Systema Entomologiæ* (4 vols. 8vo., Copenhagen), in which he for the first time made public his method. The publication of the work opened a rich field of industry and research to entomologists, and no one explored it with more enthusiasm than the author, who during the remainder of his life was constantly employed in developing and perfecting his system, for which purpose he made tours over all parts of Europe. His *Genera Insectorum* (8vo., Kiel, 1776), *Philosophia Entomologica* (8vo., Hamburg, 1778), *Species Insectorum* (2 vols. 8vo., 1781), *Mantissa Insectorum* (2 vols. 8vo., Copenhagen, 1787), *Entomologia Systematica* (4 vols. 8vo., Copenhagen, 1792–'94), and other works, show how complete and extended were his investigations in this branch of science. His later works, however, are inferior to his first, in consequence of the arbitrary and uncertain characters he was obliged to apply to the genera, as the number of species increased under his hands. He also published essays on botany and natural history, in both of which he was well informed, accounts of travels in Norway, Russia, and England, and a variety of treatises, historical, political, and economical, relating to Denmark, the latter being prepared by him in his capacity of councillor of state and professor of rural and political economy at Kiel. He died of grief, it is supposed, occasioned by the bombardment of Copenhagen, and the political misfortunes of Denmark.

FABRONI, Angelo, an Italian biographer, born in Marradi, Tuscany, in 1732, died in Pisa, Sept. 22, 1803. His chief work is his *Vitæ Italorum Doctrina Excellentium qui Sæculo XVII. et XVIII. floruerunt*, which, in the compass of 20 volumes, 2 of which were added after his death, contains 167 well written biographies of the most eminent Italian scholars and authors of the 17th and 18th centuries. He wrote also biographies of Cosmo de Medici and Pope Leo X., beside several miscellaneous and theological works.

FABYAN, or Fabian, Robert, an ancient English chronicler, born in London about 1450, died in 1512. At first a merchant, he became an alderman and sheriff of London, and wrote a general chronicle of English history, which he called the "Concordance of Stories," from the fabulous exploits of Brutus in Great Britain to the reign of Henry VII. It is a tedious narrative of the external features of transactions, without discrimination in the selection or taste in the treatment of subjects. It was first published after the author's death (folio, 1516), and has since reappeared in numerous editions, the last of which is that by Sir Henry Ellis, accompanied by notes and a learned introduction ("Chronicles of England and France," royal 4to., London, 1811). On account of its free animadversions on the Catholic clergy, Cardinal Wolsey is said, on very doubtful authority, to have caused the destruction of a portion of the first edition, copies of which are now rare curiosities, only 3 perfect specimens being known.

FACCIOLATO, or Facciolati, Jacopo, an Italian philologist, born in Torreglia, near Padua, Jan. 4, 1684, died Aug. 27, 1769. Cardinal Barbarigo, noticing his talents, sent him to the ecclesiastical seminary of Padua, where he took orders and speedily rose to be professor of philosophy, and finally head of the institution. He afterward filled the chair of logic in the university of the same city, and was charged with the task of continuing the history of that establishment which Papadopoli had begun. The king of Portugal invited him to direct the college of young nobles at Lisbon, but he refused on account of his advanced age. Beside several good editions of the classics and various works on grammar, ethics, theology, and even some poetry, he published revisions of the *Lexicon* of Schrevelius, the *Thesaurus Ciceronianus* of Nizolius, and the vocabulary of 7 languages known as the *Calepino* (2 vols. fol., 1731), in which he received much assistance from his pupil Forcellini and others. It was at the conclusion of the last named work that Facciolato and Forcellini conceived the idea of the great Latin dictionary which was published 40 years later, after the death of both, under their joint names, but which was almost entirely the work of the latter. (See Forcellini.)

FACIAL ANGLE. In the latter part of the last century, Professor Camper of Berlin proposed a new method of viewing the skull, by which it was supposed important results would be arrived at, which immediately attained a wide popularity. "The basis on which the distinction of nations is founded," says Camper, as quoted by Prichard, "may be displayed by two straight lines; one of which is to be drawn through the meatus auditorius to the base of the nose, and the other touching the prominent centre of the forehead and falling thence on the most advancing part of the upper jaw bone, the head

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being viewed in profile. In the angle produced by these two lines may be said to consist not only the distinctions between the skulls of the several species of animals, but also those which are found to exist between different nations; and it might be concluded, that nature has availed herself at the same time of this angle to mark out the diversities of the animal kingdom, and to establish a sort of scale from the inferior tribes up to the most beautiful forms which are found in the human species. Thus it will be found that the heads of birds display the smallest angle, and that it always becomes of greater extent in proportion as the animal approaches more nearly to the human figure. Thus there is one species of the ape tribe in which the head has an angle of 42°; in another animal of the same family, which is one of those simiæ most approximating in figure to mankind, the facial angle contains exactly 50°; next to this is the head of the African negro, which as well as that of the Kalmuck forms an angle of 70°; while the angle discovered in the heads of Europeans contains 80°. On this difference of 10° in the facial angle the superior beauty of the European depends; while that high character of sublime beauty which is so striking in some works of ancient statuary, as in the head of Apollo and in the Medusa of Sisocles, is given by an angle which amounts to 100°." It will be readily seen that the facial angle is a measure only of the relative projection of the forehead and the upper jaw, and that it is no measure of the capacity of the cranium itself. A protruding upper jaw will diminish the angle; a prominence of the lower part of the forehead, though the latter may have neither height nor width, will increase it; it may differ greatly in skulls which have the same capacity, and may be inferior in a skull of superior capacity. With these obvious objections to the facial angle as a measure of intellectual ability in particular cases, a general relation may still be traced between the relative development of the anterior part of the cranium, as compared with that of the upper jaw, and the amount of intellect, and thus the facial angle has a certain degree of significance. The facial angle of the Caucasian race averages about 80°, that of the Mongolian and of the American Indian about 75°, while that of the negro is but 70°. From measurements of the skulls of the superior order of apes, their facial angle has been put down as from 60° to 64°, and thus it has been argued that the negro was not only a link in the chain of creation between the ape and the white man, but that he absolutely approximated more closely to the former than to the latter. Professor Owen has proved that these measurements are founded on error, that they have been taken from young animals in whom the jaw had not yet received its full development, and that in the adult chimpanzee the facial angle is no more than 35°, while in the adult orang it is but 30°, thus establishing a wide difference between the negro and the most highly organized of the apes.

FACTOR (Lat. *facere*, to do or make) originally had almost the same meaning as agent (Lat. *agere*, to act). But while agent was used to represent every one who acted in any way in the stead of another, factor became limited to those who so act in mercantile transactions. Factor is then a mercantile agent, herein being like a broker; but the difference between them is principally this: a broker acts for his principal in reference to mercantile property which the principal retains in his hands; while the factor has possession of the goods sent to him for sale, or takes possession of those which he buys for his principal. From this difference others have grown; and the most important of these is, that the broker buys and sells as agent, while the factor may buy and sell in his own name, the party dealing with him not always knowing whether the factor or some one else owns the goods. In the United States the word factor is seldom used by merchants, because, in our practice, the phrase commission merchant has taken its place, and means much the same thing. But the word factor is retained as a law term, and the law of factors derives its importance from its being the law of commission merchants. Beside regular commission merchants, any one intrusted with the possession of property belonging to another, and authorized by the owner to dispose of it, may be a factor, as a supercargo. So a common carrier may be a factor; and while he acts as such, he is responsible only as a factor, that is, only for injuries or losses caused by want of due care; but when he has sold goods as factor, and has received the money which it is his duty to bring home as carrier, his obligations as carrier revive, and he is now liable for any loss not caused by the act of God or the public enemy. A factor is a general agent, and as such binds his principal.—The most general duty of a factor, as of every agent, is to obey the instructions he receives. But he is considered by the law merchant as an agent having much discretion, and an equal responsibility; while therefore he is bound to obey definite and positive instructions, he is not bound to pay such regard to mere intimations or wishes, because he may well believe that, whatever his principal might desire or consider expedient, if he did not give positive directions it was because he preferred leaving the decision to the discretion of his factor. And even if he have positive and precise instructions, his departure from them will be justified if it was caused by an unforeseen emergency, and if he acted in good faith, and certainly for the actual advantage of his principal. If, however, a factor buys goods for his principal and sends them to him in distinct violation of an order, his principal may reject the same, and may return them to his factor; or, if the nature of the goods and the circumstances of the case render it certainly expedient, he may sell the goods for his factor, and remit to him or credit him with the proceeds; but he must not cause any injury to his factor by his delay or negligence.

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A factor generally acquires no right to his commissions until the service by which he is to earn them is wholly rendered. But if he performs an important part, and is prevented without his fault from completing his service, and still more if the principal be in fault, it would seem from adjudged cases, as well as from principle, that he may have a reasonable compensation. Nor has he any claim for compensation unless he conducts his business with proper care and skill, and he is liable in damages for any loss his principal sustains by his want of care and skill; nor can he claim any compensation for any illegal or immoral service. A factor cannot delegate his power and right, except so far as he is authorized to do so, either expressly, or by the established usage, or by the peculiar circumstances of the case. In the absence of positive instructions, it is the duty of the factor to obey and conform to the common usage of that business, or such common usages of merchants as are properly applicable to that business; and he can, in general, bind his principal only within that usage. He has, as has been said, a considerable discretion, but is bound to use his discretion with reasonable care, and with perfect good faith. Thus, if he hastens a sale improperly, and without reasonable cause or excuse, the sale is void; as, for example, if he hurries a sale, clearly against the interest of the principal, for the purpose of realizing at once his own advances, such a sale would be considered a fraudulent sacrifice of his principal's property. Whether the factor is bound to insure the property of his principal, must depend upon the circumstances of each case. There is no general rule requiring him, as factor or commission merchant, to insure; but he would be under an obligation to do this if he were so instructed, or if a general, well established, and well known usage required it of him, and particularly if there had been antecedent acts or usages between him and his principal, from which his principal might reasonably have expected that he would effect insurance, and therefore omit doing this himself.—It is a very important question, and one not absolutely determined, how far and under what circumstances the principal has the right of revoking the authority he has given to his factor. In general, he may certainly do this before the factor has made any advances upon the goods; and may then demand them, paying of course whatever legal claims the factor may have, not for his commissions, but for expenses properly incurred about the goods, and for any especial services he has been called upon to render. The more difficult question is whether, if a commission merchant has made advances upon goods, he has not now acquired an interest in them and an authority over them, which his principal cannot defeat by revocation. And this must depend upon the familiar principle of the law of agency, that an authority coupled with an interest cannot be revoked, while any naked authority is always revocable at the pleasure of him who gave it. In Hunt *vs.* Rousmanier, 8 Wheaton, 201, Chief Justice Marshall held that an interest which can protect a power from revocation must be an interest in the thing itself about which the authority is to be exercised, and not merely an interest in that which is produced by the exercise of that power. And in subsequent cases, it seems to be the prevailing doctrine in the United States, that a factor by advances upon goods acquires an interest in the goods themselves, and that his authority over them is therefore irrevocable. In England, however, in a case tried before the court of common pleas, in which the leading American authority was cited, it was expressly overruled, and the authority held to be revocable. Hence, in England, a factor who has made advances upon goods has nevertheless no power to sell them or any part of them if positively prohibited by his principal; while in the United States he may sell so much as will cover his advances and charges, the principal having no power of disposal over more of the goods than the surplus or residue after the factor's advances are repaid. The factor, however, is not obliged to sell, but after demand and reasonable delay, may have his action against his principal for his advances.—Another question has been much agitated; that is, what power a factor has to pledge the goods consigned to him. They are placed in his hands primarily for sale; and in regard to the sale, while bound to much care and entire good faith, he has a very wide authority; but it should seem that he can have no power to pledge the goods (in the absence of express instructions), excepting so far as that power grows ont of the placing of the goods in his hands, and his relation to his principal as a general agent. By placing the goods in his possession, the principal may be said to give to his factor the power of acting as an owner, to the injury of others. It is on this gronnd that in England, and in many of the United States (especially Maine, Massachusetts, Rhode Island, New York, and Pennsylvania), such a factor, whether called commission merchant, consignee, agent, or otherwise, is deemed to be the true owner, as to sale, pledge, or other disposition of the property, while the party with whom he deals acts in good faith. A factor, whether he be a commission merchant or not, may make a special contract with his principal, to guarantee all sales made for him. In continental Europe, sometimes in England, more rarely here, such a factor is said to act under a *del credere* commission. With us he is commonly, and perhaps universally, said to act under a guarantee commission. The meaning of this is, that in addition to the usual commission (or that agreed upon) for the sale of the goods, he receives a further commission, in consideration of which he guarantees the payment by the purchaser of the price of the goods. He therefore agrees with his principal to pay the debt of the purchaser, if the purchaser does not; and this would seem to make him only a surety. The

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question is important; for if by his contract he becomes a principal debtor to the owner who is his own principal, then the owner can demand payment of him and let him look to the purchaser. But if he is only a surety for the purchaser, then the owner must look to the purchaser in the first place, and only in his default can he come to the factor as guarantor; and this latter rule seems now to prevail very decidedly both in England and the United States. But while a guarantee commission merchant is held to be a surety, it seems to be also held that he does not come within the statute of frauds, as one who promises to pay the debt of another. A guarantee commission merchant has the same claim on his principal for his advances as if he made no guarantee. If he takes a note from the purchaser of the goods, this note is the property of his principal, and he guarantees the note; and if he takes payment in depreciated paper, he must make it good. If money be paid, and he remits it in some customary and proper way, or in such way as may be specially directed by the owner, he is not responsible for its safe arrival. He may, however, make a bargain to guarantee the remittance; and if he makes such a bargain, he may charge a commission for this guarantee; but if he has a right to charge this commission, he is equally liable whether he in fact charges this commission, or does not. Even if he have no *del credere* or guarantee commission, he may still be liable to his principal, not only for his neglect or default, but by certain acts which seem to assume this liability; as if he sells the goods of several principals to one purchaser, on credit, and takes a note payable or endorsed to himself, and gets it discounted. It has already been remarked, that a factor may buy, sell, sue and be sued, demand, collect, receive, and receipt for money, all in his own name, and as a principal, while a broker can do all this only in his own name and as an agent. This difference between them springs from the possession of the goods by the factor—for possession is one of the principal *indicia* of ownership—and the non-possession of them by the broker. There is, however, a still more important difference between them, founded on the same circumstance; this is, that the factor has a lien on the goods for his advances, charges, and commissions, whether they were agreed upon or are only customary, and a broker has not. But if a factor voluntarily transfers the goods to the owner, or to the owner's order, he cannot reclaim them as his security, but retains only his personal right to demand his advances and charges from the owner. If the owner be insolvent, the factor takes then only his dividend; whereas if he still holds the possession, the other creditors can have the goods only by discharging the factor's claims in full. Therefore the factor and his principal may have claims against a purchaser which may seem to conflict; for the principal may demand his price, while the factor claims his advances and charges. In general, it may be said that if a purchaser pays in good faith to either, without notice of the other's claim, he will be protected against the other. But if the owner demands his price, the purchaser cannot set off against this, or claim to deduct, a general debt to the purchaser from the factor, unless the factor sold the goods as his own, under circumstances which gave him a right so to sell them, and the buyer believed they were his own; in which case the buyer may charge against the price, or indeed pay the whole price, by the indebtedness of the factor to him. And if before the goods are delivered, or any payment made, the buyer is notified that the goods belong to some third person, that is, some one neither the principal nor the factor, the buyer may refuse to take them; but if he takes them, he cannot set off against the price a debt due from the factor. On the other hand, if the factor has a lien on the goods, and has not lost this lien by parting with the possession of the goods, the buyer cannot set off against this lien any debt due to him from the principal, although the principal be named at the sale as the owner of the goods.—An important distinction is made between a foreign factor and a domestic factor. A foreign factor is one who transacts business for his principal in a country in which the latter does not reside; while a domestic factor acts in the same country in which the principal resides. Although every factor may act in his own name, yet in the case of a foreign factor, the law goes much further, and considers the factor as in almost all respects a principal. The reason of this is obvious. A person dealing at home with a factor whose principal resides abroad, has no means of knowing who the principal is, or what goods are his, or by what title they are his, or for what purpose they are in the factor's hands, excepting as the factor may choose to tell him. He can have no access, or certainly no easy access, to the foreign principal, for the purpose of remedy or enforcement; and, on the other hand, cannot be presumed to have bought or sold on the credit of a person thus unknown and inaccessible. It is but fair, therefore, that the factor should be, as to the purchaser, the principal; and it is equally fair that the factor should be, in such case, the only principal. These, however, are but presumptions of law. The parties may make what agreement they please, and their agreement will be enforced if shown by any admissible evidence; that is, their intention may be expressed, or it may be inferred from any circumstances which distinctly indicate it, and would then be carried into effect. In the absence of such evidence, that is, in the case of an ordinary transaction with a foreign factor, the buyer may sue the factor, and cannot sue the principal, although the principal may recover from a buyer a price not yet paid to the factor. The rule that the party dealing with the factor looks to him only, seems to be well settled, if he knew that he was dealing with the factor of a foreign principal, and reserved no right or

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claim against that principal. Whether he could sue the principal, if he did not know him at the time of the transaction, but discovered him afterward, is not so certain; for there are authorities which limit the rule to the former cases, and in the latter give the party a concurrent remedy against the factor and the principal. In general, the principal, although foreign, may sue a party dealing with him through a factor. It seems now settled that, for the purpose of this distinction, the states of the Union are foreign to each other. It is a general rule, that a principal does not lose his property by any act of his factor, as long as he can trace and identify his goods, either in the factor's hands, or into the hands of any person who holds by representation of or derivation from the factor, but only in the factor's right, and not in his own independent right, as purchaser, pledgee, or otherwise a transferee in good faith and for value. And when a principal finds his property encumbered by an act of the factor, as a pledge, or the like, he may always recover his property by paying the amount or charge for which it is thus given in security. The most important and most frequent application of this rule is in cases where the factor has become insolvent, and has made fraudulent transfers of the property, or has put it in the hands of consignees as a part of his own funds. In some of the United States a fraudulent disposition by a factor of the property of his principal is an indictable offence, and is punished with severity.

FACULTY, in universities, a body of professors appointed to give instruction in the sciences and arts, and to confer degrees in them. The ordinary faculties are those of theology, law, medicine, and the arts, the last including literature and philosophy.

FAED, Thomas, a Scottish artist, born at Burley Mill, in the stewartry of Kirkeudbright, in 1826. His father's mill was his first studio, and his earliest subjects were the rustic groups from the neighboring hamlets. In 1843 he went to Edinburgh, where his elder brother, John, was painting with success, and for some years was a pupil in the school of design of that city. After executing the well-known group of "Scott and his Friends at Abbotsford" and other works, he repaired in 1852 to London, where he has since resided. In 1855 his "Mitherless Bairn" was exhibited at the royal academy, where its pathos and beauty elicited the highest praise from all classes of visitors. His "Home and the Homeless," exhibited in 1856, and the "First Break in the Family," in 1857, have earned for him the reputation of one of the best living delineators of homely grief and natural emotion.

FAENZA (anc. *Faventia*), a city of Italy, in the Papal States, 19 m. S. W. of Ravenna, on the Lamone, at its junction with the canal of Zanelli; pop. about 20,000. It is the seat of a bishopric, and has a fine cathedral, theatre, and city hall, and several splendid private palaces. The beauty of the city and its suburbs has gained for it the name of the Florence of Romagna. Its formerly celebrated manufactures of a peculiar earthenware, called from this place *faïence*, have recently declined in importance, and its chief industry at present consists in manufactures of paper and silk twist, and in an active commerce in the products of the territory, which are taken by canal from Faenza to the Po. In Roman times this city was the scene of the defeat of Carbo and Norbanus by Metellus, the general of Sylla, 82 B. C. It was taken by the Goths in the 6th century, and by the emperor Frederic II. in 1240. It was successively subject to Venice and Bologna, and was finally united to the Papal States by Pope Julius II. in 1509.

FAGEL, a family of Dutch statesmen. I. Kaspar, born in Haarlem in 1629, died Dec. 15, 1688, succeeded John de Witt as grand pensioner, and took a prominent part as a bitter opponent of the encroachments of Louis XIV. and a zealous champion of the cause of the prince of Orange, for whose accession to the British throne he prepared the public mind of Protestant Europe. II. Frans Nicolaas, a nephew of the preceding, died in 1718, distinguished himself at the battle of Fleurus, at the defence of the fortress of Mons, of which he was the commandant, and in various other memorable engagements. III. Hendrik, born at the Hague in 1706, died in 1790, was secretary of the states-general. He exerted a great influence in the elevation of William V. to power, and was a most devoted champion of the house of Orange. The translation of Lady Montagu's letters into Dutch is attributed to him. IV. Hendrik, grandson of the preceding, died at the Hague, March 24, 1834, acted first as secretary of state, and in 1793 was sent to Copenhagen for the purpose of prevailing upon the king of Denmark to join in the war against France. In 1794 he signed the treaty of alliance between the Netherlands, Prussia, and Great Britain. During the rule of the French in Holland, he followed the royal family into exile, and returned in 1813.

FAHRENHEIT, Gabriel Daniel, a German physicist and mechanist, born in Dantzic about 1690, died in Amsterdam in 1740. He was originally engaged in mercantile business, but his predilection for the natural sciences led him at length to abandon it, and to travel in pursuit of knowledge. After visiting various parts of Germany, France, and England, he established himself at Amsterdam as a maker of philosophical instruments. Here some of the most eminent natural philosophers of the day became his friends and instructors. Fahrenheit improved the areometer, and made some progress with the design of a hydraulic machine for the draining of marshes, which he left unfinished at his death, but is chiefly distinguished for the changes which he made in the thermometer. These changes were first carried out in 1720, and have added much to the accuracy and value of that instrument. They consisted in the substitution of mercury for spirits of wine; in the

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adoption of a cylindrical instead of a mere globular bulb, and of a new graduated scale divided into 212°, ranging from the extreme point of cold observed by him in Iceland in 1709, which corresponded with that produced by a mixture of pounded ice and sal ammoniac, and which he erroneously supposed to be the lowest natural temperature, to the boiling point of water. (See THERMOMETER.) This thermometer since its first introduction has been in general use in Holland, Great Britain, and the United States. Its constructor was elected a member of the royal society of London in 1724, in whose "Philosophical Transactions" for that year are papers by him on several interesting subjects.

FAIR, a meeting held at stated times and places for purposes of trade. Such meetings on a small scale or in small country towns come more appropriately under the category of markets, while the term fair generally implies a commercial gathering of greater magnitude, although it is sometimes applied to assemblies for other purposes. Thus we hear of agricultural fairs, where the cattle and the agricultural produce of the district are exhibited by farmers and dealers; or of charity and fancy fairs held for benevolent or social purposes. Fairs for commercial purposes have been held under different names in all times and in all countries, and are probably coeval with commerce itself, since, especially before the era of railways and steamboats, some rallying point of the kind was required for the general interchange of commodities. Such commercial gatherings were known in most of the states of antiquity, especially in the provinces of Rome. The French chroniclers attribute the legal institution of their fairs or *foires* (Lat. *forum*) to the times of King Dagobert, although they doubtless existed long before. Fairs were then as now not solely devoted to trade, but were also calculated to promote social enjoyment. Fairs were established in Flanders toward the close of the 10th century.—The priory and hospital of St. Bartholomew's in Smithfield, London, founded at the beginning of the 12th century, had the privilege of holding a fair of 3 days, which became of great importance. It was no mere gathering of tumblers and mountebanks, although such might be found with the idlers crowding around them, but a great assemblage of the business community of the kingdom. The long rows of booths stretched out on the level greensward displayed the beautiful silk fabrics and embroideries of the middle ages, and the delicate filigree work of the London goldsmiths, with merchandise of a more common description. With the rapid growth of London, the fair increased in celebrity during the latter part of the 12th century and the whole of the 13th, when many foreigners (probably Flemings) swelled the number of visitors. The principal articles of trade were wool and woollen goods, but the transactions in other articles were also of considerable importance. During the 15th century the fair, although declining, continued to have a considerable attendance; but by the close of Elizabeth's reign it had become little more than a resort for pleasure seekers. In the following reign it was a mere riotous gathering, frequented by the refuse of London and its suburbs. Toward the close of the 17th century a merry-andrew showed his contempt of the solvency of the government by pretending to singe a pig with exchequer notes and roast it with the tallies. Sir Robert Walpole is said to have visited the fair to study the drift of popular feeling; and nothing could throw more light on the state of public opinion than a collection of ballads sung there, and a list of the puppet shows. During the 18th century the fair was one of the lions of London, and was a scene for the display of popular political feeling, as it had already been in the times of Elizabeth, when the trained monkey would leap over his chain at the mention of the queen's name, but gibber and sit still at that of Philip of Spain. Charles James Fox in his blue coat and buff waistcoat became a great favorite with the crowds at the fair. It displayed its sympathy with the French revolution in 1792, but with the manifestation on occasion of the trial of Queen Caroline (1820) the popularity of the fair came to an end. It was revived to some extent on the accession of Queen Victoria, but in 1838 all its shows were prohibited, and accordingly the giants, dwarfs, real live serpents, whirligigs, swings, rope-dancers, fire-eaters, conjurers, and wild beasts have long since disappeared, and nothing now remains of the once famous fair but a few stalls for the sale of gingerbread. (See "Memoirs of Bartholomew Fair," by Henry Morley, London, 1859.) Fairs, however, are still flourishing in England to some extent, but they are chiefly agricultural. A fair is held at Weyhill, in Hampshire, Oct. 10 of every year, where there is a greater show of sheep than at any other fair in Great Britain. At the August fair at Ipswich more than 100,000 lambs are annually sold. At the same place a great butter and cheese fair is held in September. The greatest horse fair in England is that annually held in August at Horncastle, in Lincolnshire. Several thousand horses are exhibited here, and dealers and amateurs resort hither from all parts of Britain and the continent, and of late from the United States. Yorkshire has also an important horse fair, particularly for Yorkshire hunters. Suffolk horses are exhibited at the celebrated Woodbridge Lady-day fair. Bristol, Exeter, and many other English cities, towns, and hamlets, have their fairs. A great cheese fair is held in April at Gloucester. The October gathering at St. Faith's near Norwich is the principal English fair for Scotch cattle. Fairs were held at Greenwich at Easter and Whitsuntide, which attracted large crowds of visitors from London to partake in the many amusements that were to be found there, also to enjoy the fresh air and the fine scenery from the park and its neighborhood; but Greenwich fair was suppressed in 1857 by the police,

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it having become the resort of vile and dissolute persons, and the inhabitants having complained of it as a nuisance. Walworth, Camberwell, and Peckham fairs have also been suppressed within a few years. The most important mart in Scotland for cattle and sheep is Falkirk fair or tryst. The largest fair in Ireland for the sale of cattle and sheep is held from Oct. 5 to 9 annually at Ballinasloe, in the counties of Galway and Roscommon. About 12,000 head of cattle and 90,000 sheep, the largest proportion of which are raised in Connaught, are annually brought to this fair.—In France, the fair of Caen is still celebrated for its trade in linen and carriage horses. At Alençon there is an annual fair for the exhibition and sale of saddle horses. The fair of Guibray is held annually in August in a suburb of that name in the town of Falaise, and was founded in the 11th century by Robert, duke of Normandy. The average transactions amount to from $3,000,000 to $4,000,000. About $300,000 of this amount is in goods manufactured at Rouen, and in hides and leather, and the rest in other French commodities. A large horse fair is also held at Guibray, where the value of the animals disposed of frequently exceeds $300,000. But Beaucaire in the south is the most important fair in France. It begins on July 1 and ends on July 28, the bulk of the business being done during the last week. Although decreasing in importance, it is still visited by 100,000 merchants from all parts of Europe, Barbary, and the Levant, and every kind of merchandise is to be found here, from the most brilliant Indian cashmere to the commonest piece of cloth. Most conspicuous among the various representatives of French industry are the cloth manufacturers of Elbeuf, and the silk, ribbon, and lace manufacturers of Lyons, St. Étienne, Avignon, Nîmes, and Paris. Guadeloupe, Martinique, and Algiers are also represented, and the French trade in sugar, coffee, indigo, spices, &c., finds here an important outlet. The fair held during the middle of September in the park of St. Cloud is as numerously attended by the inhabitants of Paris as was that of Greenwich by the Londoners. The fair abounds with crockery-raffling booths, gingerbread stalls, weighing machines with the inscription: *Avant et après dîner voyons combien nous pesons*, and with other shows. Conspicuous among the shows of the fair of 1858 was "the taking of the Malakoff," and among the visitors were many Zouaves with their shaved heads, baggy breeches, and yellow gaiters.—The annual fairs in Amsterdam, Rotterdam, and other cities of Holland, are scenes of great popular rejoicings. For several days and nights the streets are paraded by joyous crowds, and the usual sobriety of the Dutch yields on this occasion to the most boisterous and uproarious demonstrations of joviality. Theatres and shows of all kinds form the staple amusements, and among the many refreshments sold there most peculiar to Holland are wafer-cakes, a sort of thin cake baked in an iron mould, of which the consumption is enormous.—The principal fair of Italy is that of Sinigaglia, in the Papal States, which is annually held in July and August, and attended by traders from all parts of central and northern Europe, north Africa, and the Levant. Among the various products of Italian industry which change hands here, silk is most important. Fairs of less consequence are held in other parts of Italy, as well as in Spain and Portugal. The most famous fair of Madrid is annually held on May 15, at the hermitage of San Isidro del Campo, when the grand pilgrimage and festival of San Isidro draws thither crowds of the population. The great Hungarian fairs are held chiefly at Pesth. Four times during the year, in March, May, August, and November, the industrial products of Hungary are brought here for sale. Scarcely less important for the commerce of eastern Europe, and more interesting for the traveller and observer of national customs, are the fairs of Debreczin.—The fairs of the greatest European importance, however, are those of Germany. They originated there, as in many other countries, through religious festivals, which called a large concourse of people together. Hence fairs were called *Kirchmessen*, church fairs, the German word *Messe* (fair) being derived from mass. There are 4 towns in Germany whose fairs enjoy a great reputation, although many fairs are held elsewhere. The most prominent fairs are those of Leipsic, Frankfort on the Main, Frankfort on the Oder, and Brunswick. The Leipsic fairs date from the 15th century, and are the most celebrated. They are held 3 times annually, at New Year's, Easter, and the feast of St. Michael. The New Year's fair is comparatively unimportant. The Easter fair is celebrated for the book trade which centres in Leipsic, and the value of the books which change hands here frequently exceeds $6,000,000. The total value of the goods exchanged is estimated at $50,000,000; the number of visitors at 60,000. People from all parts of the world congregate here, and many Orientals may be seen in their native costume.—In central Russia, 265 m. E. N. E. of Moscow, the world-famed fair of Nijni-Novgorod is annually held for 8 weeks, beginning July 1. The fair was formerly held at Macariev, but in 1816, when that town was destroyed by a fire, it was removed to Nijni-Novgorod. It is visited by from 300,000 to 400,000 dealers. There are more than 3,000 distinct stalls for the sale of goods. These stalls are laid out in regular quarters, a particular quarter being allotted to every special class of merchandise. In one silks are on sale, in another tea, in another furs. One of the most imposing quarters is that where the Siberian iron is heaped up in ponderous piles. The vessels engaged in taking in and out cargoes are so numerous, that the waters of the Oka and the Volga rivers, at the confluence of which the town is situated, are literally covered by the mass of shipping. The total value of the goods brought to the fair amounts on an average to $50,000,000. At the fair there of 1858, $\frac{1}{5}$ more goods were brought than in 1857, and not more than $\frac{1}{16}$ remained unsold. The total value

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amounted to 95,000,000 rubles, of which 60,000,000 were in Russian produce, 10,000,000 in European and colonial, and the remainder in produce from China, Persia, and other parts of Asia. In Siberia, an annual fair is held in Kiakhta, near the Chinese frontier, which is the great emporium of the trade between Russia and China. Here Russian furs, cattle, lamb-skins, broadcloths, coarse linen, bullion, and woollen goods and iron wares are bartered for Chinese tea and silks, and other produce of the celestial empire. Large caravans of Russian and Chinese traders meet every year in December at this fair, which has existed since 1727, and has powerfully contributed to promote the commercial intercourse between the two nations. There are also many small fairs held on the borders of China and Siberia, where the Chinese barter tea, silks, and a few other articles for some of the valuable furs of the Cossacks. Mr. Atkinson, the Siberian traveller, was present at one of these fairs, and speaks of the intense gravity with which the little bands of traders assembled in these wild and desolate regions enter upon their mercantile transactions. There are many other fairs in Russia. The total value of goods brought to all Russian fairs in 1854 was estimated at $150,000,000, and the value of goods sold was $100,000,000.—The chief fairs of Turkey are those of Yenidge, Vardar, and Serres, the former commencing on Dec. 3 and continuing for abont 3 weeks, and the latter on March 21, for 3 or 4 weeks; of Okri (May 3), Varna (May 23), Philippopoli (Aug. 27), and Eski Agra (Nov. 10), each of which lasts a fortnight; and those of Yatar Bazari (Sept. 15) and Tshaltadeh (Nov. 6), which last 10 days. Conspicuous among the various traders assembled there are the Greeks and Armenians. But the greatest fair in the East is held at Mecca during the time of the annual pilgrimages. Although it has declined from its ancient magnitude, the average concourse of pilgrims and visitors still amounts to 100,000.—The largest Indian fair is held at the vernal equinox at Hurdwar, in Saharunpoor, a famous resort of pilgrims of North Hindostan. No fewer than 200,000 to 300,000 persons congregate there every year, and every 12th year the number of pilgrims and visitors frequently exceeds 1,500,000. This fair is the great focus for the produce of Nepaul, the Punjaub, Afghanistan, and Bokhara, chiefly consisting of horses, cattle, camels, Persian dried fruits, spices, drugs, shawls, &c.—Apart from their great commercial interest, all these fairs present curious social and national characteristics. Eastern life unfolds itself nowhere with greater picturesqueness than at the fairs held during the pilgrimages at Mecca in Arabia and at Hurdwar in Hindostan. Nowhere is religion blended so intimately with commerce as during these annual congregations in the East, when Brahmins and merchants, dervises and hawkers, symbols of faith and quackeries of trade intermingle in fantastic and lively groups of men, women, and children, all decked out in the many colors of their national costumes, and presenting the most motley contrasts of characteristics. So we find Chinese and Russian life represented with daguerreotypic accuracy at the fair of Kiakhta, in Siberia, while Nijni-Novgorod eclipses probably all other fairs in the picturesque variety of Russian and oriental costumes and habits which it exhibits.—According to Prescott's "History of the Conquest of Mexico," fairs were held in the principal cities of ancient Mexico every 5th day (there having been no shops), which were thronged by a numerous concourse of persons. "A particular quarter was allotted to each kind of article. The transactions were conducted under the inspection of magistrates appointed for the purpose. The traffic was carried on partly by barter, and partly by means of a regulated currency of different values. This consisted of transparent quills of gold dust; of bits of tin, cut in the form of a T; and of bags of cacao, containing a specific number of grains." Fairs were regularly held at Azcapozalco, not far from the capital, for the sale of slaves. The gatherings in the market of Tlascala were a sort of fairs, where pottery which was considered as equal to the best in Europe formed one of the principal articles of trade, and every description of domestic produce and manufacture was brought there for sale. But the greatest fair was held in the city of Mexico. The visitors there were estimated at from 40,000 to 50,000. The city then swarmed with a motley crowd of strangers, the causeways were thronged, and the lake was darkened by canoes filled with traders flocking to the great *tianguez*. The most perfect order reigned throughout the vast assembly. A court of 12 judges sat in one part of the *tianguez*, clothed with absolute power, which they exercised with great vigor. In Prescott's "History of the Conquest of Peru" it is stated that the ancient incas instituted fairs for the facilitation of agricultural exchanges. They took place 3 times a month in some of the most populous places, where, as money was unknown, a rude kind of commerce was kept up by the barter of products. These fairs afforded so many holidays for the relaxation of the industrious laborer.—In the United States, the most important fairs are those of the U. S. national agricultural society, of the state agricultural societies, of the Franklin institute at Philadelphia, mechanics' institute at Boston, American institute at New York, and of various other public institutions. These are, however, merely competitive exhibitions of animals and industrial products, and have no commercial character. An anti-slavery fair is annually held at Boston, which is attended by many of the opponents of the system of slavery; and fairs for various charitable and religious purposes are frequently held in all parts of the country, at which the greatest possible variety of articles are brought together by donation or by purchase, and the proceeds of their sale applied to some specified object.

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FAIR HAVEN, a village of New Haven co., Conn., on both sides of Quinepiack river, which separates New Haven from East Haven, 2 m. from the state house; pop. about 4,000. The chief business is transacted on the Quinepiack river, which expands into a bay extending up from New Haven harbor. There are 4 ship yards. Thirty vessels are owned in Fair Haven, with a tonnage of 4,500. Some are in the Mediterranean and in the West India trade; and during the winter season most of the others are engaged in the oyster trade to the Chesapeake and Delaware bays, &c., and in the summer in the coasting trade. Beside the oysters brought from the south, vast beds are planted in the shallow waters at the mouth of the Quinepiack and in New Haven harbor in the spring, and taken up the succeeding season. Fair Haven is supposed to be more extensively engaged in the oyster trade than any other place in the United States. One concern disposes of more than 200 cargoes during a season, averaging from 2,500 to 3,000 bushels each. About half as many more are sold by other parties, or taken up from the beds, so that in all about 750,000 bushels of oysters are used in the trade. Kegs are manufactured in the place in vast quantities to meet the demand of the oyster trade. Fair Haven, as well as New Haven, is extensively engaged in the manufacture of carriages. It contains 5 churches, 3 Congregational, 1 Episcopal, and 1 Methodist. The growth of the place has been rapid within the last few years; and from being merely a place of trade and resort, it has become an elegant and tasteful village, with many private residences, surrounded by extensive yards and gardens.

FAIRBAIRN, William, an English civil engineer and machinist, born in Kelso on the Tweed in 1789. He received the rudiments of his education at Newcastle, where he was employed in a coal pit, and was brought up as an engineer at the Percy main colliery, where he remained 7 years. In 1817 he commenced business as a machine maker in Manchester. For upward of 20 years his firm was the most important of the kind in Manchester, and among the improvements he introduced may be mentioned simpler contrivances for driving the machinery of factories, modifications in the valves of steam engines, the double-flued boiler, the use of ventilated buckets in water wheels, the invention of the riveting machine, &c. In 1830–'31, his attention having been drawn to the advantage of iron as a material for building ships, he constructed a small iron vessel, which was successfully launched, and is believed to have been one of the first of its class in England. Subsequently he constructed at Millwall many vessels of the largest size of the same material. He was also one of the first to attempt buildings of iron. As a member of the British association for the advancement of science he has contributed to its "Transactions," as well as to those of other learned scientific bodies, the results of many interesting experiments on the comparative strength of hot and cold blast iron, from which the best form of section for iron beams and the strength of various materials under specific conditions have been determined. His experience in the iron manufacture caused him to be consulted with regard to the construction of the tubular bridge over the Menai strait; and in connection with Mr. Hodgkinson he engaged in a number of experiments, the result of which has been to introduce into general use wrought iron plate girders in ordinary building operations as well as in railway engineering. He has published a series of lectures, under the title of "Useful Information for Engineers." He delivered lectures in 1858 on the "Resistance of Tubes to Collapse," on the "Floating Corn Mill for the Navy," on the "Progress of Mechanical Science," &c.

FAIRFAX, a N. E. co of Va., separated from Md. and the district of Columbia by the Potomac river; area, 430 sq. m.; pop. in 1850, 10,682, of whom 3,250 were slaves. The Occoquan river touches it on the S. W. On the bank of the Potomac, in this county, and 15 m. below Washington city, stands Mount Vernon, the residence of George Washington. The surface of Fairfax co. is generally hilly. The soil in some places is sandy, and in others is nearly worn out; but there are many fertile and well cultivated districts, producing good crops of grain and hay. Cattle are raised extensively. In 1850 the county yielded 207,531 bushels of Indian corn, 56,155 of wheat, 122,758 pounds of butter, and 4,420 tons of hay. There were 16 churches, 1 newspaper office, and 355 pupils attending schools and academies. Formed in 1742, and named in honor of Lord Fairfax, who owned a large part of N. E. Virginia. Value of real estate in 1856, $4,363,267. Capital, Fairfax Court House.

FAIRFAX, Edward, an English poet of the Elizabethan period, the translator of Tasso's "Jerusalem Delivered," born in Denton, Yorkshire, died in 1633, in the parish of Faystone. His father, Sir Thomas Fairfax, was one of the military adventurers of the time, passed his youth in European wars, and was at the sack of Rome in 1527; but the son was studious in his youth, lived in the country, and loved the society of books. The translation of Tasso's epic, by which alone his name is remembered, was made in his youth, and dedicated to Queen Elizabeth, and was long enthusiastically admired. After long neglect its popularity has revived in the present century, and several recent editions have appeared in England and the United States. The last American edition was in 1855. He also wrote a prose work on demonology, still in manuscript, a "History of Edward the Black Prince," the manuscript of which was destroyed by fire at Whitehall, and a few eclogues.

FAIRFAX, Thomas, baron, grand-nephew of the preceding, a parliamentary general in the civil wars of Charles I., born in Denton, Yorkshire, Jan. 1611, died Nov. 12, 1671. He studied

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at St. John's college, Cambridge, and, after the manner of his ancestors for many generations, sought military adventure in foreign campaigns. He served as a volunteer in Holland, under the command of Lord Vere, whose daughter he afterward married, returned to England in 1634 or 1635, and lived in retirement till the breaking out of the war in 1642. With a wife inclined to Presbyterianism, and a father actively and zealously disaffected to the king, Fairfax did not hesitate to become a champion of the parliament; but, an admirer of monarchy in the abstract, he took up arms only in defence of parliamentary rights against a single oppressive monarch. When the king retired northward, and set about raising a guard for his person at York, Fairfax presented himself to him at the head of a multitude of 100,000, praying that he would desist from raising an army against his people, and would return and hearken to his parliament. The first hostilities took place in Yorkshire, where Fairfax and his father, who were now respectively Sir Thomas and Ferdinando Lord Fairfax, were the most powerful of the adherents of the parliament; and accordingly the latter received a commission as general of the forces in the north, while his son was appointed general of horse under him. They were denounced as traitors by the earl of Newcastle, the royal commander in those parts, who was in turn proclaimed a traitor by the parliament. The first attempts of the Fairfaxes were not successful; they were defeated in several encounters, and completely routed in an attack upon the royalist forces under the earl of Newcastle at Atherton Moor. The first parliamentary success of 1644 was the relief of Nantwich, in Cheshire, besieged by Lord Byron with an army of Irish. This was effected by Sir Thomas Fairfax, who marched from Lincolnshire in the depth of winter, and engaged and defeated Byron with great loss. In this battle Monk, the future restorer of the monarchy, was taken prisoner by the parliamentarians. Fairfax returned into Yorkshire, and in conjunction with his father defeated at Selby Col. Bellasis, the royalist governor of York, and then joined the Scotch army, which to the number of 20,000, under the command of Lord Leven, had crossed the Tyne. The forces of Leven and Fairfax, united with the earl of Manchester's army, in which Cromwell was major-general, now proceeded to besiege York, where the royalists had betaken themselves; but hearing of advantages gained by the enemy, they broke off the siege and took up their position at Marston Moor, 8 m. from the city. Here on July 8 they were attacked by the cavaliers, under their ablest leaders, among whom was Prince Rupert. This brilliant general dashed in upon the Scots on the left, and quickly drove them off the field. Sir Thomas Fairfax on the opposite wing gained a temporary success; but the victory was decided only by the steady valor of the republicans under Cromwell. This defeat was a blow from which the royal cause never recovered. York was immediately forced to surrender, and Sir Thomas quickly reduced the remaining royalist fortresses north of the Trent. The passage of the self-denying ordinance in 1645 obliged the contending parliamentary generals to lay down their commissions; and Sir Thomas Fairfax, who not only for his services, but as a representative of the nobility and of the Presbyterian interest, was entitled to the generalship, received from parliament the appointment of commander-in-chief of the forces. He immediately repaired to London, was presented to the house of commons by 4 members, was complimented by the speaker, and received from him his commission. The privilege was given him of selecting his own subordinate officers, subject only to the approbation of parliament; and on April 3 he departed for Windsor, where he had appointed the general rendezvous, and where with the assistance of Cromwell, who was his lieutenant-general, he set about new-modelling the army. On June 14 the hostile forces met at Naseby. The royalists were commanded by the king in person, supported on the right and left by Prince Rupert and Sir Marmaduke Langdale. In the parliamentary army, Cromwell was opposed to Langdale on the right, Fairfax faced the king in the centre, and Ireton encountered Rupert on the left. The charge of Prince Rupert as usual could not be resisted by those who were opposed to him, and he quickly changed his side of the engagement into a chase, detached himself from the main body, and did not reappear on the field of battle till Fairfax and Cromwell had pierced the royalist ranks in all directions, and the day was lost. The personal valor of Fairfax was especially signalized in this battle. He was constantly in the thickest of the fight, and rode about bareheaded after his helmet was beaten to pieces. He now quickly recovered Leicester, Langport, Bridgewater, and Bath. Bristol soon surrendered, and the speedy reduction of the kingdom followed, Fairfax and Cromwell having to this end divided their forces. In the politics of the dominant party Fairfax had now to play the difficult part of a sincere advocate of monarchical power. He seems to have been led on by Cromwell, and to have been the instrument of projects whose depth he could not fathom. In 1648 he marched against the last remains of the royalist party, and annihilated it at Colchester. His own influence declined as that of Cromwell and the Independents increased; and though his loyal instincts recoiled from the judicial trial of royalty, he was unable to prevent it. His own name was even placed first on the list of regicide judges; but he refused to take part in the tragedy, and was at a distance while the judgment was pronounced and the fatal blow struck. He however accepted the command of all the forces of England and Ireland under the new government, put down the Levellers in Oxfordshire, and composed the troubles in Hampshire. When in 1650 the Scots declared for Charles II., he refused to march against them, and laid down his

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commission. He retired to his country seat at Nun-Appleton, Yorkshire, where he passed his time in study and in rural occupations, and prayed for the reëstablishment of the royal family. At the first signal given by Monk, which offered a hope of its restoration, he issued from his retreat, followed by a body of gentry and an Irish brigade which his reputation had attracted from the ranks of the Independent army. Monk having entered England, Fairfax took possession of York, Jan. 1, 1660. Being elected to parliament, he gave his consent to the restoration of the monarchy which he had done so much in destroying, and was at the head of the committee appointed to wait upon the king at the Hague. He presented to King Charles the horse on which he rode to his coronation, after which he went back to peaceful occupations in retirement. Lord Fairfax was a friend of learning, and in his youth devoted much attention to antiquarian studies. During the siege of York, when a tower containing many ancient documents was blown up, he rewarded the soldiers for bringing him as many as could be found, and employed Roger Dodsworth to copy them, settling upon him an annuity of £40 for life; they now make a part of the *Monasticon Anglicanum*. When he took possession of Oxford, June 24, 1646, the first thing he did was to set a guard over the Bodleian library, which otherwise might have been destroyed. He wrote a narrative of his career from the commencement of the war, not intended for the public eye, but which was published in 1699 under the title of "Short Memorials of Thomas, Lord Fairfax."

FAIRFAX, Thomas, 6th Baron Fairfax of Cameron, a British nobleman, born about 1690, died at Greenway Court, near Winchester, Va., in 1782. He was educated at Oxford, subsequently held a commission in the horse guards, and enjoyed a reputation as a wit and man of letters, having in the latter capacity contributed some papers to the "Spectator." A disappointment in love induced him to abandon the gay world, and almost to forswear female society; and, probably under its influence, he visited Virginia in 1739 to look after the large estates he had inherited from his mother, the daughter of Lord Culpepper, governor of the province between 1680 and 1683, and which the latter had acquired partly by a grant from Charles II., and partly by purchase. They comprised upward of 5,700,000 acres lying between the Potomac and Rappahannock rivers, on both sides of the Blue Ridge, including a great portion of the Shenandoah valley. Lord Fairfax was so pleased with the physical and social aspects of Virginia, that he resolved to pass the remainder of his life there. He erected a beautiful seat called Belvoir, near Mount Vernon, on the Potomac, where he lived in the style of an English country gentleman, engaging in fox-hunting and other field sports, and dispensing an elegant hospitality. In 1748 he made the acquaintance of George Washington, then a youth of 16, and, impressed with his energy and talents, employed him to survey his lands lying west of the Blue Ridge. This was the commencement of an intimacy between Fairfax and Washington, which survived all differences of opinion on political subjects, and terminated only with the death of the former. So favorable was the report of Washington, that his employer soon after took up his residence at Greenway Court, situated in the midst of a manor of 10,000 acres, about 12 miles from Winchester, where during the remainder of his life he lived in a state of baronial hospitality. He was an untiring lover of the chase, living for half the year among his dogs and horses, and was in the habit of entertaining his fox-hunting companions with great liberality. Washington, who acquired from him his taste for hunting, was frequently his guest until the commencement of the revolutionary war, and regarded his opinions with deference. During the panic on the Virginian frontier after the defeat of Braddock, Fairfax organized a troop of horse, and, as lord lieutenant of Frederic county, called out the local militia; and when advised that his residence was exposed to attacks from hostile Indians, although in his 66th year, he positively refused to leave. During the revolutionary war he adhered to the royal cause, but so popular was he with his neighbors that he continued to live unmolested in Greenway Court. The surrender at Yorktown deeply wounded his national pride, and, according to tradition, was the immediate cause of his death, which happened soon after. The generosity of Lord Fairfax is exemplified in the surrender of his large estates in England to his brother, and in his frequent gifts of lands to his poor neighbors in Virginia.

FAIRFIELD, the name of counties in 3 of the United States. I. A S. W. co. of Conn., bounded N. E. by the Housatonic river, S. E. by Long Island sound, and W. by the state of New York; area, 647 sq. m.; pop. in 1850, 59,775. It has excellent harbors all along the coast, and contains several important commercial ports. The Housatonic is navigable by steamboats, and supplies valuable water power. The surface of the county is considerably diversified; in the N. and W. it is hilly; in the S. and E. nearly level. The soil is good, and produces grain, potatoes, and hay. In 1850 it yielded 350,603 bushels of Indian corn, 276,916 of oats, 381,158 of potatoes, 38,238 of buckwheat, 72,010 tons of hay, and 1,086,786 lbs. of butter. There were 128 churches, and 9,051 pupils attending public schools. The county is traversed by railroads from New York to New Haven, and from Bridgeport to Albany. Capitals, Fairfield and Danbury. II. A central district of S. C., bounded S. W. by Broad river, and N. E. by the Wateree; area, 680 sq. m.; pop. in 1850, 21,404, of whom 14,246 were slaves. It is traversed by 2 railroads, connecting it with Charleston and other points, has an uneven surface, and a fertile soil, suitable for cotton, grain, and potatoes. In 1850 it produced 18,122 bales of cotton, 529,461 bushels of Indian corn, 30,233 of wheat, 47,277

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of oats, and 65,569 of sweet potatoes. There were 37 churches, 2 newspaper offices, and 992 pupils attending schools and academies. Capital, Winnsborough. III. A central co. of Ohio, with a surface diversified by hills, plains, and rolling lands, and a soil of great fertility; area, 490 sq. m.; pop. in 1850, 30,264. It is intersected by the Ohio and Hocking canals, and the Zanesville and Cincinnati railroad, and is drained by the head stream of Hockhocking river, and by several small creeks. Limestone and freestone are abundant. In 1850 there were produced 1,858,862 bushels of Indian corn, and 582,137 of wheat. In 1850 there were 93 churches, 5 newspaper offices, and 6,140 pupils attending public schools. Capital, Lancaster.

FAIRFIELD, formerly the shire town of Fairfield co., Conn., situated on Long Island sound, and on the New York and New Haven railroad, 22 m. from New Haven and 54 from New York; pop. about 4,000. Since Bridgeport has become a city at the termination of the Naugatuck and Housatonic railroads, it has absorbed much of the business which formerly centred in Fairfield; and to accommodate the public, the county buildings and offices have also been transferred to Bridgeport. The village is half a mile from the sound, principally on one broad street, and in the vicinity are spacious hotels for the accommodation of visitors during the summer. The village of Greenfield, in which Dr. Timothy Dwight resided, is in this township. About 1½ m. E. of Fairfield village is Black Rock, one of the finest harbors in Connecticut, accessible for large vessels at all times of the tide. Ship-building is carried on at this place. About 2 m. W. of Fairfield, at the mouth of Mile river, is the borough and harbor of Southport, in which are a bank, several churches, and educational institutions. Much of the business and enterprise of Fairfield are centred in this borough. Fairfield was settled in 1639 by 8 or 10 families from Windsor, and was incorporated in 1646, when it took its present name, having previously borne the Indian name Uncowa. In 1779 it was burned by the British under Gov. Tryon.

FAIRFIELD, a post village and capital of Jefferson co., Iowa, situated on Big Cedar creek, and connected by a plank road with Burlington, 50 m. distant; pop. in 1853 estimated at 1,500. It is a prosperous trading place, and one of the most important interior towns of the state. It is the seat of a branch of the state university, and contains a female seminary, 2 newspaper offices, and a land office.

FAIRHAVEN, a township of Bristol co., Mass., on Buzzard's bay, 55 m. S. E. from Boston; pop. in 1855, 4,693. The principal village, from which the township is named, is built on the left bank of the mouth of Acushnet river, opposite New Bedford, with which it is connected by a bridge and a ferry. The river expands between the two places into a fine harbor, about 1 m. wide. The whale fishery is the principal business of the town, and in 1855 there were engaged in it 46 vessels belonging to Fairhaven, with an agregate burden of 15,532 tons, and a complement of 1,324 hands; capital employed, $1,620,394; sperm oil imported, 95,628 galls., valued at $150,829; whale oil imported, 662,622 galls., valued at $392,613; whale bone imported, 243,448 lbs., valued at $94,917. The town also contained 2 cotton mills, 1 brass foundery, 1 paper mill, and 2 soap, candle, and oil factories; capital employed in manufacturing, $103,700; annual product, $233,168; hands employed, 111. In 1858 it had 11 churches (2 Baptist, 1 Christian, 1 Congregational, 1 Friends', 3 Methodist, 2 Second Advent, and 1 Unitarian), a high school, a bank, and a savings bank. A branch of the Cape Cod railroad terminates here, by which, as well as by the New Bedford branch of the Boston and Providence railroad, Fairhaven communicates with Boston.

FAIRIES. Whether the fairy mythology arose spontaneously in Europe in the age of the troubadours, or was a relic of ancient Celtic and druidical superstition, or belonged to the old paganism of Scandinavia and northern Germany, passing thence southward, especially through the Normans, or was derived from the Orient through the Spanish Moors and the crusaders, are questions which antiquaries and critics have not been able fully to determine. The fays or fairies (Fr. *fée*, Ger. *Fee*, It. *fata*), under manifold names and with various local or national diversities, may be traced in the popular traditions and romantic literature of Europe from the 12th century, appearing first in the *Nibelungenlied* and the romances of chivalry. It is probable that they were originally an invention of Celtic fancy; but if so, the conception of their nature and functions was modified and enriched in the early middle ages by admixture from foreign sources, chiefly from the Scandinavian myths of *dvergar* or dwarfs, and the Persian and Arabian fictions of peris, djinns, and other genii. The Hindoo-Persian tale of the "Garden of Knowledge," written in India by Ynáyel-úllah about 1650, contains peris, who nearly resemble the fairies of western romance. Even the classic *dii campestres*, the sylvans, satyrs, and fauns, may have been blended with them. In the most limited sense of the term, the fairies are hardly distinguished from the elves, except that they belonged more peculiarly to the British isles and to France, and the latter to the Teutonic nations. They were freakful little creatures of preternatural power, familiar to rustics long before they were celebrated in romance. In the most general sense, they embrace nearly all the characters of the romantic mediæval mythology, as the elves, dwarfs, trolls, norns, nisses, kobolds, brownies, necks, stromkarls, undines, nixes, salamanders, goblins, hobgoblins, ponkes, banshees, kelpies, pixies, moss people, good people, good neighbors, men of peace, wild women, and white ladies. Fairies appear in the romances of Arthur and the round table, especially in *Isaie le Triste*, the latest of them, and in

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greater brilliancy and power in those of Charlemagne and his paladins. The earliest of the romances of chivalry probably is that of Lancelot du Lac, one of the knights of the round table; and the wonderful beauty and skill of the fairy Viviana, the lady of the lake, who had learned the art of enchantment from Merlin, are famous in the annals of female treachery. Lancelot, educated by her, conceived an ardent passion for Genevra, the wife of King Arthur, and drew upon himself all kinds of misfortunes by disdaining the fairy Morgana. The fairies of early romance seem to have been only mortals endowed with supernatural powers, and they did not assume their manifold grotesque characteristics as distinct species till some of the related elements of various mythologies had been confounded in the popular mind.—The dwarfs and elves figure as diminutive creatures in the Eddas and the whole body of Scandinavian sagas, the former being often violent and malignant, the latter sportive, fond of dancing, visible only to children born on Sunday, often useful, and sometimes mischievous. The 3 great norns named Udr, Verthandi, and Skulld (past, present, and futnre) were the Scandinavian Parcæ or destinies, rnling the events of life. The nisses were domestic fairies of Norway, resembling the kobolds of Germany and brownies of Scotland, fond of frolicking by moonlight and driving in sledges in the winter, and skilled in music and dancing. Every church had its nis, called the kirkegrim, that looked after propriety of manners, and punished misconduct. The rivers and lakes of northern Europe were inhabited by necks, stromkarls, and other beings similar to mermen and mermaids, or to the kelpies of Scotland, who were commonly renowned as musicians, playing on harps the melody of which operated on all nature, and who would teach their art to any person that presented them with a black lamb.—Among the numerous objects of German popular superstition are dwarfs and elves, wild women, kobolds, and nixes or water spirits. The dwarfs are called also the still people and the little people, and have their abodes underground and in the clefts of mountains, visiting the surface of the earth only by night; they can make themselves invisible and pass through rocks and walls, and are generally silent and beneficent to men. The "little wights" are a species of dwarfs of southern Germany, about ¾ of an ell high, appearing as old men with long beards, dressed like miners in leather aprons, and bearing lanterns and a smith's tools. They announce the death of a miner by knocking 3 times. The forests of Germany are haunted by numerous kinds of dwarfs, little larger than elves, gray and old-looking, hairy and clad in moss. Their great enemy is the wild huntsman, who chases them by night with a pack of ghostly hounds. The German wild women, like the elf maids of Scandinavia, are beautiful and devout, with fine flowing hair, and their chief haunt is the famed mountain Wunderberg, on the moor near Saltzburg. This mountain is said to be hollow, and to contain palaces, churches, monasteries, gardens, and springs of gold and silver. Beside the wild women there live in it little men, who guard the treasures, and go forth at midnight to the cathedral of Saltzburg, where they perform their devotions; giants, who used to frequent the church of Grödich and exhort the people to a pious life; and the emperor Frederic Barbarossa, with golden crown and sceptre, and a knightly retinue, whose gray beard has twice encompassed the table at which he sits, and when it has a third time grown round it the end of the world will take place. The fair maiden who figures in the legend of the Oldenburg horn was a wild woman. Kobolds are fairies that become domestic servants. When about to attach himself to a family, the kobold throws chips into the house and dirt into the milk vessels. If no notice be taken of this, he comes and stays in the house. Famous among kobolds are Hinzelmann, whose history was written by Feldmann; Hödeken, or Little Hat, so named because he always wore a little felt hat down over his face; King Goldemar, the intimate friend of Neveling von Hardenberg; and the naked mannikins, who till the present century were believed to perform domestic exploits at Cologne. The nixes inhabit lakes and rivers; the male is like a man, except that he has green teeth and always wears a green hat; and the female appears uniformly as a beautiful maiden. They have a magnificent subaqueous abode, whither they sometimes convey mortals; on sunny days they comb their golden locks in the branches of trees; and they may be seen dancing on the surface of the water previous to the death of a person by drowning. They figure in multitudes of German stories.—The *fate*, or Italian fairies, first appear prominently in literature in the *Orlando innamorato* of Boiardo. There the Fata Morgana (the Morgana fairy) is mentioned, the powerful sister of King Arthur and pupil of Merlin, famous for her enchantments, for the tricks that she played her sister-in-law Genevra, and for being believed to be the cause of the mirage of the strait of Messina, to which her name is given. There also figures the beautiful Silvanella, who raised a tomb over Narcissus, and then dissolved away into a fountain; the white and black fairies, the protectresses of Guidone and Aquilante; and Alcina, the sister of Morgana, who carried off Astolfo. Some of these reappear in the *Orlando furioso* of Ariosto, but the *Amadigi* of Bernardo Tasso presents the fairies in greater number and splendor than elsewhere in Italian poetry. They are styled indifferently *maga*, *incantrice*, or *fata*, and prominent among them are Morganetta, Nivetta, and Carvilia, the 3 daughters of Morgana. All the fairies and witches, according to Ariosto, are subject to the redoubtable Demogorgon, who has a splendid palatial temple in the Himalaya mountains, where every 5th year he summons them to appear before him and give an account of their actions.—The most celebrated Spanish

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fairy is the *duende* or *trasgo*, a domestic sprite, often mentioned in Spanish literature. Calderon's comedy *La dama duende* is founded on the playful tricks of a lady who personates the *duende* to the mystification of her lover and of her own family.—The fairy lore of France resembles that of England, and corresponds in many respects with that of Germany. The *fées* or fairies, and the *lutins*, *gobelins*, or goblins, answer to the Gothic kobolds and nisses. The former are handsome in person, dance in circles or fairy rings by night, haunt solitary springs and grottos, mount and gallop strange horses, sitting upon the neck and tying together locks of the mane to form stirrups, always bring luck by their presence, and, like the fairies of most countries, were believed to preside at births, to love young children, to give them presents, and to steal them away, leaving instead their own fairy offspring, which were called changelings, and were usually most beautiful in countenance and most evil in propensities. In the 12th and 13th centuries the forest of Brezeliande, near Quentin, in Brittany, was thought to contain the tomb of Merlin, and to be a chief seat of the fairies. The white ladies were Norman fairies, and often malignant. They were supposed to be attached to certain great families, in whose affairs they interfered, sometimes for good, sometimes for evil. The white lady of Avenel in Sir Walter Scott's romance of "The Monastery" is an instance of this kind. The *lutins* or goblins were playful and malicious elves, pinching children and maidens, twisting their hair into inexplicable knots when they were asleep, and delighting to perplex peasants and to bring them into difficulty. Melusina, the most renowned of French fairies, was married to Raymond, count of Lusignan. She was, however, truly described as *ange par la figure, et serpent par le reste*, and exacted from her husband an oath that he would never see her on Saturday. After having borne to him several children, she was at length surprised by him in a bath on Saturday, transfigured into a mermaid, her true shape, when she flew from the castle with wailing and lamentation, in obedience to a decree of destiny that she should flit about the earth in pain and suffering, as a spectre of the night, until the day of doom. It was believed that she appeared near the castle of Lusignan in mourning dress, and uttering piercing lamentations, whenever a lord of Lusignan or a king of France was about to die. The traditions concerning her were collected by Jean d'Arras near the close of the 14th century. One of the chief articles of accusation against the maid of Orleans was that she resorted to a fountain of the fairies to see her visions; and in Brittany there are still fountains regarded by the natives as sacred to the fairies, and believed to sometimes change into gold or diamond the hand that is inserted into them.—The fairies of England were first called elves, and, though often mentioned before in romances, assumed their most prominent place in poetry in the reign of Elizabeth. Chaucer, in his "Wife of Bathes Tale," charged the monks and friars with having expelled the fairies from the land by their vigilance:

> In olde dayes of the king Artour,
> Of which that Bretons speken gret honour,
> All was this land fulfilled of fayrie;
> The elf-queene with her joly compagnie
> Danced ful oft in many a grene mede.
> This was the old opinion as I rede;
> I speke of many hundred yeres ago.
> But now can no man see non elves mo,
> For now the grete charitee and prayeres
> Of limitoures and other holy freres,
> That serchen every land and every streme,
> As thikke as motes in the sonne-beme,
> Blessing halles, chambres, kichenes, and boures,
> Citees and burghes, castles highe, and toures,
> Thropes and bernes, shepenes and dairies,
> This maketh that there ben no faeries.

Somewhat later, in the reign of Henry VI., fairies form much of the machinery of the metrical romance of "Sir Launfal," one of the knights of the round table, written by Thomas Chestre. The fairies of the "Faëry Queen" of Spenser and those of the "Midsummer Night's Dream" are not the same. The former are stately beings, typical of the moral virtues, with traits borrowed from the Italian fairy mythology, dwelling in enchanted castles, surrounded by courts of knights and ladies, and ruling over extensive kingdoms. Shakespeare adopted the elves and pixies of popular superstition, with their diminutive stature, fondness for dancing, love of cleanliness, and child-stealing propensities, formed them into a community ruled over by Oberon and Titania or Queen Mab, and gave immortality to "that merry wanderer of the night," Puck, alias Robin Goodfellow, alias Hobgoblin. The "Mad Pranks and Merry Jests of Robin Goodfellow" (printed by the Percy society, 1841) was originally published in the age of Shakespeare, and furnishes the first records of this mischievous son of a fairy, who "from hag-bred Merlin's time" had been famous for his pranks. Corresponding to him are the Rubezahl or Number Nip of German fairy lore, the Cluricaune of Ireland, the Eulenspiegel of Germany, and the Howleglass or Owlespeigle of Scotland. Ben Jonson refers to Mab as

> . . . the mistress fairy,
> That doth nightly rob the dairy;
> And can hurt or help the churning
> As she please without discerning.
> She that pinches country wenches
> If they rub not clean their benches,
> And, with sharper nail, remembers
> When they rake not up their embers;
> But if so they chance to feast her,
> In a shoe she drops a tester.

Drayton and Herrick excel among the minor English poets in their happy use of the fairy mythology.—The mediæval fairy lands are of 8 kinds: those that are placed in the ocean, like the castle and isle of Avalon, the abode of Arthur, Oberon, and the fairy Morgana, most fully described in the old French romance of *Ogier le Danois;* those that lie within the earth, like the palace of Pari Banou, one of which is finely described in the old English romance of "Orfeo and Heurodis;" and those which are situate "in wilderness among the holtis hairy,"

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like Oberon's realm of Mommur, one of which appears in the romance of "Sir Thopas."—The popular superstition of the middle ages attributed many natural phenomena to the agency of the fairies. In Ireland and Scotland they were believed to shoot at cattle with arrows headed with flint stones, and thus to bewitch them; and the small arrow heads of the aboriginal Irish are known to country people and antiquaries as elf arrows. The *ignis fatuus* was termed the elf fire, other luminous appearances fairy sparks, moles or other defects on the person fairy nips or elvish marks, and a matted lock of hair in the neck an elf lock.—The earliest collection of European fairy stories in prose was the Italian *Notti Piacevoli* of Straparola (Venice, 1550). The best Italian collection is the *Pentamerone* of Giambattista Basile (Naples, 1637; translated from the Neapolitan by W. E. Taylor, London, 1856). It is full of learned allusions and keen satire, and designed for the amusement only of grown persons. Near the end of the 17th century the *Contes des fées* of Perrault and Madame d'Aulnoy, and their successors, gave vogue to fairy stories throughout Europe, written chiefly for the instruction and amusement of children. The "Arabian Nights' Entertainments," introduced into Europe by Galland about the beginning of the 18th century, contributed much to their popularity, and were quickly followed by various imitations of the Arabian, Persian, Turkish, and Mongol tales. The "Tales of the Genii" by James Ridley, the *Fables et contes Indiens* of Langles, and the later *Contes Chinois* of Remusat are examples. The "Nourjahad" of Mrs. Sheridan was an imitation of them, and the eastern tales of Count Hamilton were written partly to ridicule them. The abbé de Villiers also satirized them, and Wieland made his Don Sylvio von Rosalvo the Don Quixote of fairy literature, which he sought to banish as Cervantes had expelled the romances of chivalry. The best later imitations are some of the tales of Tieck, Musäus, and Novalis, and especially La Motte Fouqué, and the romance of the caliph "Vathek," by Beckford. The German fairies are rarely terrible for a long time, and in stories where the indignation of the reader is strongly excited, the effect is soon neutralized by some touch of pleasantry or kindly stroke of fate. The dwarfs, who are the incarnation of malignity, are made ridiculous rather than formidable. Even death takes the kindly form of a generous godfather, in contrast with the weird mournful banshee of the Irish legends. Around the inveterate simpleton or sluggard there gather in the German imagination a host of ridiculous blunders and adventures, the special work of delighted fairies. The Irish fairy tales have the wild, imaginative character common to most of the Celtic legends. Nor is the intercourse with the fairy powers so easy and comfortable as in the German tales; there is not the same genial intimacy and happy understanding, nor can it always be presumed amid overwhelming difficulties that satisfactory conclusions are near. Three Teutonic legends, resembling many fairy stories, have acquired an almost national character in England—"Jack the Giant-Killer," "Jack and the Bean Stalk," and "Tom Thumb." The plucky Jack, who employs brains as well as fists, is an old English school-boy ideal of valor and enterprise. The tale of the diminutive Tom Thumb, who was not unlike the pigmy of the Greek poets of the weight of one obolus, and wearing lead in his shoes from fear of being blown away by the wind, illustrates the advantages of skill and activity over mere size and strength, and the mishaps natural to his want of harmony with the general order of creation. —The best works on the subject are Keightley's "Fairy Mythology" (enlarged ed. 1850); Scott's "Essay on the Fairy Superstition" in the "Minstrelsy of the Scottish Border;" Croker's "Fairy Legends and Traditions of the South of Ireland" (1825); Dalyell's "Darker Superstitions of Scotland" (1838); "Russian Popular Tales," translated from the German of Dietrich, with an introduction by Grimm (London, 1857); Dasent's "Popular Tales from the Norse" (1859); *Les fées du moyen âge*, by Maury (Paris, 1843); and the *Kinder- und Hausmärchen* (1812; 6th ed. 1851), and other publications of the brothers Grimm.

FAIRY CIRCLE, a frequent phenomenon in fields and meadows in Great Britain, once attributed by the peasantry to the feet of fairies in dancing their rondels. A fairy ring or circle is either a bare circular path about a foot broad, enclosing a grass plot about 7 yards in diameter, or a spot of different dimensions, with a circumference of grass, which is higher, sourer, and greener than the surrounding grass. Shakespeare mentions the elves that

> By moonshine do the green-sour ringlets make,
> Whereof the ewe not bites.

Various theories have been invented to account for these circles. Waldron not only ascribed them to the fairies, but said he had seen similar circles in the snow, in which the impressions of tiny feet were visible. Aubrey supposed them to be caused by the efflux of a fertile subterranean vapor. Priestley and others considered them the effect of lightning; and Waller, after a thunderstorm, observed one of them which from the color and brittleness of the bordering grass seemed to be newly burned bare. Others have thought them to be caused by moles or similar animals burrowing under ground. Dr. Wollaston accounted for them by the growth of a species of agaric, which so absorbs all nutriment from the soil as for a time to destroy the herbage. Dr. Carpenter also thought them occasioned by masses of fungous vegetation.

FAKIR (Arab. *fakhar*, poor), the name of a mendicant order in the East Indies, like the dervises of Persia and Turkey. The origin of fakirism in India is traced back to mythical times, when a powerful rajah having banished his son, the latter is fabled to have resolved to

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lead a vagabond life in the world, to beg his bread, and to make proselytes to his own manners and customs. The first condition of an Indian mendicant monk is poverty. He wears a rent robe, such as the Mussulmans pretend the ancient prophets wore. In 9 things, according to Hassan al Bassri, he is like a dog: he is always hungry; he has no sure abiding place; he watches by night; he never abandons his master, even when maltreated; he is satisfied with the lowest place; he yields his place to whoever wishes it; he loves whoever beats him; keeps quiet while others eat; and accompanies his master without ever thinking of returning to the place which he has left. The number of Mussulman and Hindoo fakirs in India is estimated at more than 1,000,000; beside whom there are many other religious ascetics. Some fakirs live isolated, go entirely naked, and sleep upon the ground with no covering. They never use wood for making fire, but employ instead the dried dung of cows; regarding this as an act of devotion, since the cow is in India a sacred animal. They carry a cudgel on which are hung rags of various colors, and they traverse the country begging and instructing credulous people in religion. It is dangerous both to his life and money for an unprotected person to meet them. The second class of fakirs is composed of those who unite into companies. These are clothed, wearing a fantastic and many-colored robe. They choose a chief, who is distinguished by having a poorer dress than the others, and who has a long chain attached to one of his legs. When he prays he shakes his chain, and the multitude press around him, and embrace his feet, and receive his counsels and precepts. He has formulas for the cure of the paralytic, and especially of sterile women. Some of the fakirs have almost a military organization. They bear the lance and other arms, display a banner while on the march, sound a horn and beat a drum on their arrival at a station and also on their departure. There is one class of fakirs which is highly honored. They are the children of poor parents, who live in retirement in mosques, devoted to the reading of the Koran and the study of laws, till they become qualified for the duties of *mollahs* or doctors of theology.

FALAISE (anc. *Faleria*), a town of France, department of Calvados, 22 m. S. S. E. of Caen, on the river Ante, built upon cliffs, commanded by an old Norman castle and surrounded by a picturesque country; pop. in 1856, 8,138. It has a college, library, and equestrian statue of William the Conqueror, who was born here. The celebrated fair of Guibray, instituted in the 11th century, is annually held here in August in a suburb of that name.

FALCK, Antonius Reinhard, a Dutch statesman, born in Utrecht in 1776, died in Brussels, March 16, 1843. He studied at the university of Göttingen, and on his return home applied himself to the law. Subsequently he held certain municipal offices, and from 1802 to 1806 he was secretary of the Dutch embassy at Madrid. In 1808 he was appointed by King Louis secretary-general of Indian affairs. In 1813 he was instrumental in bringing about the revolution which led to the establishment of a provisional government, of which he was appointed secretary. In the following year, when the prince of Orange was proclaimed king of the Netherlands, Falck became the leading spirit of the new government. From 1814 to 1818 he acted as chief secretary of state, and in the latter year he was intrusted with the departments of public instruction, commerce, and colonial affairs. In 1816 he reëstablished the academy of Brussels, and the reforms in the primary schools and the university were due to his zeal in the cause of education. The contest, however, which soon broke out between Belgium and Holland resulted eventually in Falck's withdrawal from the administration. He reëntered the diplomatic service, was employed on several missions to the court of Vienna, took a part in the negotiation of a commercial treaty between England and Holland, and in 1824 became ambassador at London. During the negotiations which terminated in the separation of Belgium from Holland, his services were again called into requisition, and in 1840 he became Dutch ambassador at Brussels. He wrote an essay on the influence of Dutch civilization upon northern Europe, especially upon Denmark, which was published in 1817 in vol. i. of the "Transactions of the Third Class of the Royal Institute of Holland."

FALCON, a bird of prey, belonging to the order *accipitres*, family *falconidæ*, sub-family *falconina*, and to the typical genus *falco* (Linn.). This sub-family contains the following genera, in addition to *falco*, of which about a dozen species are described: *hypotriorchis* (Boie), with as many species; *ieracidea* (Gould), with 2 species, found in Australia; *tinnunculus* (Vieill.), with a dozen species; *ierax* (Vigors), with 6 species, in India and its islands; and *harpagus* (Vigors), in South America, with a single species, characterized by having the lateral margin of the bill armed with 2 distinct teeth on each side. The birds of these genera may all be called falcons, from the common characters of a short bill, much curved from the base to the tip, with its sides more or less furnished with serrations called teeth; the cere covering the nostrils, which are rounded or linear; the wings lengthened and pointed, the 2d and 3d quills generally the longest; the tail lengthened and rounded; toes long and slender, and claws curved and acute. The birds of the genus *falco*, which only will be treated in this article, are called noble birds of prey, because in proportion to their size they are the most courageous and powerful; they are also more docile, and were formerly much used in the sport of falconry to pursue and kill game, returning to their masters when called. The pigeon hawk (*H. columbarius*, Linn.), and the sparrow hawk (*T. sparverius*, Linn.), though both falcons, will

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be described under these names. The falcons are found throughout the world, regardless of climate; they are powerful and rapid fliers, hovering over their prey and darting perpendicularly upon it; they pursue birds chiefly, but attack also the smaller quadrupeds. The common or peregrine falcon (*F. peregrinus*, Linn.) has a large and round head, a short thick neck, a robust body broad in front, stout short tarsi, covered with imbricated scales largest in front, the tibial feathers covering the knee, long and strong toes and sharp claws. The plumage is compact and imbricated, the feathers rounded on the back, broad on the breast, long and pointed on the sides; between the eye and bill and on the forehead they are bristly. The bill is blackish blue at the tip and pale green at the base, the iris hazel, the feet bright yellow, and the claws black. The head and hind neck in the adult male are grayish black tinged with blue, the rest of the upper parts dark bluish gray with indistinct dark brown bars; the quills dark brown, with transverse reddish white spots on the inner webs; the grayish brown tail has about 12 blackish bars, diminishing in breadth and intensity from the tip; the throat and front of neck white; a broad triangular mark of blackish blue extends downward on the white of the cheeks from the corner of the mouth; the sides, breast, and thighs are reddish white, with transverse dark brown spots; the under wing feathers are whitish, with transverse darker bars. The length is about 16½ inches, the extent of wings 30, bill 1½, tarsus 1½, and middle toe 2¼ inches. In old males the tints of the back become lighter, sometimes ash-gray; the young males are darker, with rufous tips and edges to the feathers, and the tail is blacker, with reddish white tips and bars; there is considerable variety at the different ages in the birds of the United States and of Europe. The adult female, as in birds of prey generally, is nearly ¼ larger than the male, being about 20 inches in length, 36 in extent of wings, with the beak, tarsus, and toes longer; the color of the upper parts is deeper brown, with the tips of the secondaries and tail whitish; the transverse markings run higher up on the breast, and are broader and of deeper hue on the other parts; the color below is more yellowish, and the vent feathers are reddish. This falcon, which is also called the great-footed and the duck hawk, according to Audubon, was formerly rare in the United States, which it now can hardly be said to be. It flies with astonishing rapidity, turning in its course in the most surprising manner. A favorite prey is the duck, which it seizes on the wing, on the surface of the water, or on land; when within a few feet of its victim, it stretches out the legs and claws and drops upon the trembling bird almost perpendicularly; if light, it flies off with it immediately to some quiet place; if too heavy, it kills and devours it in the nearest convenient place. It has been known to attack a mallard on the wing, and even to pounce upon a wounded teal within a few yards of the sportsman. Pigeons, blackbirds, water fowl, and beach birds, and even dead fish, are eaten by this falcon. Turning the bird it has caught belly upward, it clears off the feathers from the breast and tears the flesh to pieces with great avidity. This species is solitary, except during the pairing of the breeding season, which is in very early spring; it is found in all parts of the United States and in Cuba, coming to the south in the winter months. The nest is made of coarse sticks, generally on the shelf of some precipitous rock; Audubon is of opinion that they breed in the United States; they are common on the shores of Hudson's bay and arctic America in the summer, according to Richardson; the eggs are rounded, of a reddish brown color, with irregular markings of a darker tint. The peregrine falcon is distributed over temperate Europe, where the country is mountainous and the sea coast precipitous. This bird, when in full plumage and good condition, for its compact muscular form, great strength, boldness, and ferocity, may be taken as the very type of a bird of prey; it is among birds what the lion and tiger are among mammals; fearless in attack, swift in pursuit, strong and cruel, it justly claims the first rank among the noble birds of prey. Before the invention of gunpowder, these birds were very frequently trained to pursue herons and various kinds of game, and falconry was a favorite sport of kings and nobles; even now falcons are occasionally used for this purpose in Great Britain. Birds of prey have been trained to the chase from remote antiquity; the custom is mentioned by early writers, but it was not till the time of Huber, in 1784, that the distinction between birds of high and low flight, which had long been understood in practice, was shown to exist in the anatomical structure of the wings and talons. The falcons belong to the former division; from their long and slender and entire wings, when they wish to rise in the air vertically they are obliged to fly against the wind, though obliquely they easily mount to great elevations, where they sport rapidly in all directions; they carry the head straight; their claws are long, supple, sharp, and their grasp is firm; they seize their prey at once if small and slow, but strike repeatedly with their talons to weaken and arrest the flight of heavier and swifter birds, and with great precision attack the vital part at the hollow of the back of the head or between the shoulders and ribs. These birds have been called rowers from their mode of flight. The ignoble birds of prey, as the goshawk and other hawks, are called sailers; their wings are shorter and thicker, with their surface interrupted by the unequal lengths of the quills, and they fly to best advantage with the wind, sailing with the wings extended and motionless, allowing themselves to be carried along by the wind; their talons being shorter, less powerful, and straighter than in the falcon, they strike with less force and precision, and when they have seized a bird or a quadruped compress it

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to death or strangle it with their claws; their beaks are not toothed, and they can seldom penetrate the skulls of the larger birds; they prefer to hunt in thick woods, while the falcons pursue their prey high in the air. Falcons and hawks are best trained from the nest; they have bells attached to their feet, jesses of soft leather to the tarsi, and hoods on the head which prevent them from seeing while they allow them to eat; birds taken after they have left the nest, or which have been caught in snares, are the most difficult to train, and confinement, hunger, fatigue, and purgatives are employed to subdue them to a point necessary for lessons; they are taught to leap upon the hand of their master to receive food, which is placed on a rude representation of the bird or animal which they are to be taught to pursue; from an effigy they are advanced to living animals, with more or less length of tether, until left at perfect liberty. The larger and older the bird, the more difficult the training, and the most ignoble are generally the most rebellious; in the order of docility these birds are the merlin, the hobby, the common falcon, and the jerfalcon (all noble birds), and the ignoble hawks are the least docile, though the goshawk is said to be very easily trained. They are fed with beef and mutton, deprived of all fat and tendon, and scrupulously cleaned of all dirt; they are taught to pursue other birds of prey, the heron, the crow, the pie, the hare, larks, quails, partridges, and other game. Descriptions of the lordly sport of falconry can be found in the romances of Walter Scott and other delineators of the days of chivalry. (See FALCONRY.) The falcon is a very long-lived bird; there is a tale that one belonging to James I. in 1610, with a gold collar bearing that date, was found at the cape of Good Hope in 1793, and though more than 180 years old, was said to be possessed of considerable vigor; the natural term of life of this species, however, must be much less than this. As an example of their speed, may be mentioned the falcon of Henry IV. of France, which flew from Fontainebleau to Malta, 1,000 miles, in a day; and many similar instances are on record.—The lanner (*F. lanarius*, Linn.) seems to be an undoubted species of northern Europe and Asia, and intermediate between the jerfalcon and the peregrine; it is about 1½ feet long, with wings ¾ as long as the tail; its colors resemble those of the young peregrine, and the name even has been applied to immature birds of this species; but Mr. Gould in his "Birds of Europe" figures and describes it as distinct. It has not the black spot on the cheeks, and the markings of the breast are longitudinal instead of transverse; it would doubtless be a superior bird for training.—The Iceland or jerfalcon (*F. gyrfalco*, Linn.) is the largest of the genus, and varies much in its appearance at different ages. In the adult the head is nearly white, the feathers of the crown having hair-brown shafts, those of the nape having the brown more extensive; the under parts are white, the breast, thighs, and tail coverts pure white, but the sides and abdomen are often spotted and lined with brown; the upper parts have the centre of the feathers hair-brown, with a white margin; the greater coverts, secondaries, and quills are barred with brown and edged with white, and the 2 central feathers of the otherwise white tail are barred with brown; the bill is pale blnish gray, with the upper tooth and the lower notch strongly developed; the legs and feet are colored like the bill. Some specimens are almost entirely white. The length is from 20 to 24 inches, the extent of wings a little over 4 feet, the bill 1¼ and the tarsus 2 inches; according to Audubon, in the immature state, as observed by him in Labrador, the female, though the longer and heavier bird, has the extent of wings less by an inch than the male; the weight of the male is a few onnces less, and that of the female a few ounces more than 3 lbs. The form is that of a very powerful bird, the tail being larger in proportion than that of the peregrine, and the tarsi feathered 1¼ inches downward. It ranges over the northern regions of Enrope and America; Iceland is one of its favorite resorts, so much so that the bird has received one of its most common names from this island; it is found along the precipitous shores of Norway and Sweden, and in Greenland, the arctic regions, and the Hudson's bay district, extending as far south as Labrador, where Audubon found it breeding; it is rare in Great Britain, and is a northern and maritime species, especially frequent near the breeding places of sea fowl. In manner, flight, and cry, it resembles the peregrine, being if possible more daring. In falconry this species was highly prized, and extraordinary prices were formerly paid for them; they were brought chiefly from Iceland and Norway. There is still much uncertainty about the varieties of this bird; naturalists generally make but one species, but the falconers are of opinion that the Iceland and the Norway birds are distinct species; if the latter be true, the American bird may also prove different from any of the European species. Audubon describes and figures a pair of immature birds which he obtained in Labrador in August. The general color of the plumage in this condition is brownish gray above, the feathers having a narrow paler margin; the upper tail coverts, quills, and tail are tipped, spotted, and barred with brownish white; the throat is brownish white, with 5 streaks of brown, and the lower parts generally are of the former color, longitudinally patched with dark brown; the under tail coverts are striped alternately brown and white. The female has the same colors, except in having the 2 middle tail feathers spotted with white like the others, these in the male being without the spots. The nest found by Audubon was about 2 feet in diameter, flat, made of sticks, sea-weed, and mosses. The eggs, according to Mr. Yarrell, are dull white, mottled all over with pale reddish brown. They feed in Labrador on puffins, grouse, partridges, ducks, hares, and other animals of this size, and

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also on fish. Mr. Hancock ("Annals and Magazine of Natural History," vol. xiii., 1854, p. 110), who described the Greenland falcon (*F. Groënlandicus*, Hanc.) as a distinct species, says it is never dark-colored like the young of the Iceland falcon, its plumage from the nest being whiter than the mature livery of the latter, and not unfrequently as white as that of the adults of its own species. The mature Greenland bird is distinguished from the young by the cordate and arrow-head markings of the back and scapulars; the young have above large oblong spots, with long narrow dashes on the head and lower parts, the marking from dark gray becoming with age almost black; the cere, feet, and toes also change from light livid blue to pale yellow. Like other falcons, it gets the mature plumage at the first moult. In fact, the Greenland falcon may be said to have a white plumage with dark markings, and the Iceland bird dark plumage with white markings; whether they are distinct species or not will be determined by the definition of what constitutes specific characters. Both species occur in America; the Greenland bird probably does not breed in Iceland, and is only occasionally seen there, driven from its more northern haunts by severe weather; the Iceland bird sometimes breeds in Greenland. The weight of evidence seems to be in favor of these birds being distinct species.—Other falcons, which have been trained to pursue game, are the *H. subbuteo* (Linn.), *H. æsalon* (Gmel.), and *T. alaudarius* (Briss.), which will be described respectively under the popular names of HOBBY, MERLIN, and KESTREL.

FALCONER, WILLIAM, a British poet, born in Edinburgh in 1730, died by shipwreck in Dec. 1769. He was the son of a barber, and when very young, having received but the first rudiments of an education, was sent to sea. At the age of 18 he became second mate in the Britannia, which was shipwrecked off Cape Colonna, on the coast of Greece. Falconer was one of the 3 who survived the wreck, which afterward became the subject of his principal poem, the "Shipwreck." This was published in 1762, after he had been for a time a diligent student, and had suffered also another disaster at sea. Soon afterward the duke of York procured him the appointment of midshipman in Admiral Hawke's ship, the Royal George, which was laid up in 1763. He now married, compiled a "Universal Marine Dictionary" (republished in 1815, enlarged and modernized by W. Burney, LL.D.), and wrote several poems, including a political satire directed against Lord Chatham, Wilkes, and Churchill. In 1769 he again went to sea, in the frigate Aurora, bound for India, which, after touching at the cape of Good Hope, was never heard from again.

FALCONET, ÉTIENNE MAURICE, a French sculptor, born in Paris in 1716, died in 1791. He was a pupil of Lemoine, and early gained distinction by a statue of Milo of Crotona, which opened for him the doors of the academy of the fine arts. Many of his works were destroyed at the time of the revolution. None of them, however, were equal in merit to the immense bronze equestrian statue of Peter the Great, which he executed at St. Petersburg, by order of Catharine II., in 1776.

FALCONRY, the art of training falcons or other birds of prey for the chase, the sport itself being called in English hawking, in French *le vol*. A falconry is also the place where such birds are kept. The practice of hawking is of very ancient date in Europe, and of yet more remote antiquity in Asia. Both Asia Minor and China present many legends concerning it. Pliny has been thought to allude to a custom of the Thracians, by which hawks were employed to catch other birds; but the meaning of his words is doubtful. We have no mention of it among the Romans till after the time of Vespasian. It was certainly in existence in the 4th and 5th centuries. In Britain it appears to have been a favorite recreation in the reign of Ethelbert, king of Kent, A. D. 760. King Alfred had his falconers, and a book on falconry is still extant, attributed to Edward the Confessor. Harold II. is represented in the Bayeux tapestry as visiting the court of Duke William of Normandy with a hawk on his fist. The Domesday book makes frequent mention of falconries and eyries for breeding. In the time of Henry II., William Knot, the king's tenant, paid his rent at the exchequer in 3 hawks and 3 jerfalcons. King John was devoted to the sport. Geoffrey Fitzpeine gave him 2 good Norway hawks to obtain permission for a friend to export cheese. Nicolas, a Dane, was to give the king a hawk every time he came trading to England. A letter of Henry III. (1249) to the king of Norway, asking him for hawks, yet remains. Froissart says that when Edward III. invaded France, he was accompanied by 30 mounted falconers. At this time it was felony to steal a hawk, and taking its eggs, even on one's own ground, was punished by imprisonment for a year and a day, with fine at the king's pleasure. Elizabeth reduced the term of imprisonment to 3 months, but the offender was compelled to find security for 7 years, or be imprisoned till he died. The sport died out in England in the time of the Stuarts. In France, falconry was most practised in the time of Francis I., 1515–'47. He was the first who appointed a "grand falconer of France;" the predecessors of that functionary were simply called "the king's falconers." The grand falconer of Francis I. had an annual revenue of 4,000 florins, and had under him 50 gentlemen and 50 falconers, the whole establishment costing annually 40,000 florins. Under Louis XIV. the institution was yet more expensive. Louis XVI. tried to reduce the expense of the royal falconry, but without success; but finally the revolution swept it away. In Germany the sport was honored in the reign of the emperor Frederic II., and in the 14th century fiefs called *Habichtslehen*, or hawk tenures, were granted on condition of payment in trained hawks. The sport retained

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its existence in Germany till toward the close of the 18th century. In Italy falconry was a favorite pastime, and every student of Italian literature must remember Boccaccio's tale of the "Falcon." In the East, the Persians are skilful in training falcons to hunt all manner of birds, and even gazelles.—While it flourished in Europe, hawking was the principal amusement of lords and ladies. Knights courted ladies by attention in the hawking field, flying their birds, and restoring them to their mistresses' wrists. Herons were the most honorable quarry, and were therefore held in estimation second only to birds of prey. A knowledge of the management of hawks was an essential piece of noble education. Quite as much as "to winde the horn," it was necessary to know a hawk from a hernshaw. The vocabulary of hawking was as extensive as its ordinances, and several of its terms have been adopted into the langnage. Hawks' legs were their arms; their talons, pounces; wings, sails; the long feathers of the wings, beams; tail, the train; breast feathers, the mails; crop, the gorge. A cover for the bird's head was the hood. When the hawk fluttered to escape, it bated; to sleep was to jouk; to stretch one wing back was to mantle; to shake itself was to rouse; to recross its wings again was to warble; to tear the feathers from its prey was to plume; to raise its prey aloft before descending was to truss; to descend on its prey was to stoop; to fly off after crows was to check. A living prey was quarry; when dead, pelt. Taming a bird was called reclaiming, by the French *affaitage;* and an old, stanch, pattern hawk was called a make-hawk. No rank was excluded from the enjoyment of hawking, but each condition of men must confine themselves to their peculiar grade of hawk and quarry. As the hawk tribe do not breed freely in captivity, the birds of chase were either taken young from the eyry, or were caught in springes. (See FALCON.) Various attempts have been made in England, in recent times, to revive the sport of falconry, but the enclosure of farms, equally with a change in public taste, is against it. The sinecure office of grand falconer of England is hereditary in the family of the duke of St. Albans.—Mr. Atkinson, in his work on "Oriental and Western Siberia" (London, 1858), describes a species of falconry in use among the Kirghiz. The party whom he accompanied set out with an eagle and a falcon, and had not gone very far before they discovered several large deer. In an instant the eagle was unhooded, and his shackles removed, when he sprang from his perch, and soared up into the air. Having risen to a considerable height, he seemed to poise himself for about a minute, and giving 2 or 3 flaps with his wings, swooped off in a straight line toward his prey. He went with great rapidity; his keepers followed him at full gallop, and were about 200 yards off when the eagle struck his prey. The deer gave a bound forward, and fell. The eagle had struck one talon in his neck, and the other into his back, and with his beak was tearing out the animal's hair. The Kirghiz sprang from his horse, slipped the hood over the eagle's head and the shackles upon his legs, and removed him from his prey without difficulty. The keeper mounted his horse, the eagle was placed on his perch, and he was ready for another flight. No dogs are taken out when hunting with the eagle, as they would be destroyed; and the Kirghiz assert that he will attack and kill the wolf. Foxes are also hunted in this way. The wild goat and the smaller kinds of deer are also taken in considerable numbers.—Among the most noted treatises on falconry is one written by Frederic II. of Germany (1209–'50), annotated by his son Manfred, and republished with several other treatises by J. G. Schneider in 1788 (2 vols., Leipsic). Others are: the famous "Boke of St. Albans," by the lady Juliana Berners (fol., 1481), containing the "Treatyses perteynyng to Hawkynge, Huntynge, and Fysshynge with an Angle;" *Hieracosophion, vel de Re Accipitraria*, a poem in 3 books, by De Thou (1584); *La fauconerie*, by Charles d'Esperon (Paris, 1605); Latham on "Falconry" (1615–'18). The most recent works on the subject are "Falconry in the British Isles," by Salvin and Brodrick (London, 1855), and "Falconry, its Claims, History, and Practice," by G. E. Freeman (London, 1859).

FALERII, an ancient city of Italy, one of the 12 Etruscan cities, situated a few miles W. of the Tiber, and N. of Mount Soracte. It was the capital, and perhaps the only city of the Falisci, a people of Pelasgic origin, whose territory extended from the Tiber to Lake Vigo, and who in the early ages of Rome were reckoned among the most dangerous enemies of the republic. It is first mentioned in Roman history in 437 B. C., when the Falisci lent their support to the Fidenates, who had revolted against Rome. It was besieged by the Romans in 394 B. C. The inhabitants were said to have been at length induced to surrender less by force of arms than by the example of the Roman general Camillus, who refused to profit by the treason of a schoolmaster that proposed to deliver up to him the children of the principal men. The Falisci rose in rebellion against Rome in 293, and again in 241, when they were punished by the destruction of their town. The inhabitants were removed to a less defensible site, where a colony was established named Junonia Faliscorum, from a famous temple of Juno. The latter site is now occupied only by a farm house and a ruined church, but a large portion of the ancient walls, with their gates and towers, still exists.

FALERNUS AGER, a district in the northern part of Campania, extending from the Massican hills to the bank of the Vulturnus, and from which the ancient Romans obtained one of their choicest wines. The Falernian wine was red, very spiritnous, and most powerful when from 15 to 20 years old. Its excellence is celebrated by the Roman poets, particularly by Horace. It was declining in quality in the time of Pliny,

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from want of care in the cultivation, and the vineyards disappeared in the 6th century.

FALIERI, Marino, 56th doge of Venice, and the most celebrated of the several doges of the same family, born in 1274, beheaded in Venice, April 17, 1355. In 1346 he rendered eminent services to the republic as commander-in-chief at the siege of Zara, in Dalmatia, where he achieved a victory over the king of Hungary. Subsequently he was Venetian ambassador at Genoa and Rome. In 1354 he was summoned home from Rome, and called upon, although 80 years old, to preside as doge over the government of Venice. His administration began under sinister auspices, the entire Venetian fleet of 61 vessels being within a month captured by the Genoese, with a loss to the former of 4,000 men killed, and nearly 6,000 prisoners. Hardly had the new doge succeeded, Jan. 5, 1355, in concluding a 4 months' truce with Genoa, when a contest broke out in his own palace, which proved fatal to himself. A young nobleman of Venice, Michele Steno, enamored of one of the dogessa's maids of honor, on occasion of one of the balls given during carnival at the palace, took liberties with the young lady which, although excusable under the excitement of the season, gave umbrage to the doge, who was a man of great irascibility of disposition, and who ordered Steno to leave the palace. The young man, exasperated by this treatment, avenged it by writing upon the chair of the doge the following words: *Marino Falieri dalla bella moglie, altri la gode ed egli la mantiene* ("Marino Falieri's beautiful wife is supported by him, but enjoyed by others"). The doge's wrath knew no bounds, and as the senate and the councils refused to treat the affair as a question of state, and the criminal court sentenced Steno to only a brief term of imprisonment and a year's exile, he determined to wreak vengeance by exterminating the whole body of the nobility, who were hated by the populace as tyrants. The day fixed for the consummation of this design was April 15, 1355, but the conspiracy was discovered on the evening previous; the doge was arrested, and after a full confession of his guilt, he was sentenced to death and beheaded upon the great stairs of the ducal palace. As soon as his head had fallen, the president of the council of ten stepped upon the balcony, brandishing a blood-stained sword in his hand, and exclaiming that justice had been executed upon a great culprit. In the council hall of the palace, where the portraits of the doges of Venice are religiously preserved, a black drapery covers the spot intended for that of Falieri, bearing the ominous inscription: *Spazio di Marino Falieri, decapito.* The fate of the doge has been a favorite theme with poets. Byron made it the subject of a tragedy, in the notes to which a full account is given of the history of Falieri.

FALK, Johann Daniel, a German philanthropist and author, born at Dantzic in 1768, died Feb. 14, 1826. His passion for knowledge overcame all the difficulties with which the poverty and ignorance of his parents surrounded him in early life, and he entered the university of Halle, where he produced several satirical poems, which attracted the notice of Wieland, who introduced him into the literary circles of Weimar. After Goethe's death Falk published an account of his personal intercourse with him (*Göthe aus näherem persönlichem Umgange dargestellt*, 2d ed., Leipsic, 1836). A selection of Falk's writings appeared in 1818, and a new collection of his satirical works in 1826. He wrote for the *Taschenbuch*, or "Album," of which he was the editor, an article on the inefficient condition of the hospitals in Berlin, which induced the government to reform them. In 1813 he founded at Weimar a charitable institution for the education of poor children, which bears to this day the name of *Falkisches Institut*.

FALKIRK, a municipal and parliamentary borough of Scotland, in the county of Stirling, on a commanding eminence, 24 m. W. of Edinburgh; pop. in 1851, 8,752. It has a fine parish church, several churches of dissenting congregations, and 22 schools, attended by 1,100 pupils. There are in Falkirk, and in the connected villages of Grahamston, Bainsford, and Carron, printing establishments, tanneries, breweries, a manufactory of pyroligneous acid, the immense iron works of Carron, a foundery employing 500 men, and branches of the banks of Scotland and of England. Its chief celebrity, however, is due to its cattle fairs, the most important in Scotland, which take place annually in August, September, and October, each lasting from 2 days to a week. The last is the largest of the 3. These *trysts*, as the Scots call the fairs, have flourished more than 200 years. Falkirk was a place of note in the 11th century. The ancient parish church, built by Malcolm Canmore in 1057, was demolished in 1810 to give place to the present one. Here Edward I. in 1298 conquered William Wallace, and in 1746 the young pretender, Charles Edward, defeated the English army under Gen. Hawley. Formerly the Scotch bagpipe players had an annual assembly at Falkirk.

FALKLAND, a royal borough of Scotland, in the county of Fife, at the foot of East Lomond hill, 22 m. N. of Edinburgh; pop. in 1851, 1,330. It is an old town, consisting mostly of a single street, ill built, and so commanded by the Lomond hill that the sun never shines upon it in the winter. Its royal castle was an ancient fortress of the Macduffs, but was forfeited to the crown in 1424, and became a favorite rendezvous of the kings of Scotland on hunting excursions. James V. and VI. enlarged and embellished it. Cromwell ruined the park to get timber for a fort at Perth. The palace was held by the famous Rob Roy in 1715. This town gives the title of viscount to the English family of Cary.

FALKLAND, Amelia Fitzclarence, viscountess, an English authoress, born Nov. 5, 1803, died in London, July 2, 1858. She was

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the youngest of the 5 daughters of William IV. by Mrs. Jordan, and was married, Dec. 7, 1830, to Viscount Falkland. She was a lady of considerable literary attainment. Her last work, "Chow-chow," appeared shortly before her death.

FALKLAND, Lucius Cary, viscount, an English politician and man of letters, born in Burford, Oxfordshire, in 1610, killed Sept. 20, 1643. His father, Sir Henry Cary, who was made Viscount Falkland in the peerage of Scotland in 1620, held various offices under James I., among which was that of lord deputy of Ireland, which caused Lucius to commence his education at Trinity college, Dublin, where he acquired a thorough knowledge of Latin and French. Returning to England at 18, he studied at St. John's college, Cambridge. When only 19 he was imprisoned by order of the privy council, because he had warmly resented his removal from command of a company; but his imprisonment lasted only a few days. At the same age he came into possession of the estate of his maternal grandmother, wife of Chief Baron Tanfield, worth above £2,000 per annum. He married Letitia Morrison, a marriage that gave his father much offence, as the lady's fortune was small. He visited Holland, with the view of entering upon a military life; but he did not succeed, and returned to England, where he substituted letters for arms. Taking up his residence at Great Tew, a few miles from Oxford, he began a severe course of study, resolving not to visit London until he had acquired Greek. The death of his father in 1633, by which he became Lord Falkland, forced him to break his resolution, as he had to visit the capital on business. His fortune was not increased, the family estate being mortgaged to its full value. Resuming his country life, which he continued for 6 years longer, he had for his associates learned men from Oxford, and others from London. His house was as free to them as to himself, and it is stated that they required no invitation to take possession of the apartments regarded as their own. To those who needed assistance Falkland readily afforded it, and in the most delicate manner, and it was justly said that he seemed to hold his estate in trust "for worthy persons who needed assistance, as Ben Jonson and others." Among his friends were Chillingworth, Waller, Edward Hyde, Cowley, Sandys, Morley, Sheldon, Hammond, John Hales, and Sir F. Wenman. It was at Great Tew that Chillingworth wrote his book against the Jesuit Nott, and in the society there its points were debated, he sometimes giving way to the judgment of his friends. Falkland wrote himself, both in prose and verse. He studied theology deeply, and occurrences in his own family led him to publish a "Discourse of the Infallibility of the Church of Rome." He was the author of other works, now little known. In 1639 he joined the army with which Charles I. meant to fasten Episcopacy upon Scotland, but had no opportunity to distinguish himself. He was chosen a member of the short parliament, in April, 1640, for Newport, Isle of Wight. He was elected to the long parliament from Newport, and shared deeply in the determination to establish the government on a constitutional basis. When the impeachment of the earl of Strafford was proposed, however, he wished the house to proceed with deliberation; but the country party knew that to give the earl time was to give him victory, and hence Falkland's proposition was not entertained. Falkland was a strenuous advocate of the bill of attainder, even when it was opposed by Pym and Hampden, who preferred proceeding by impeachment. He moved the impeachment of the lord keeper Finch. He distinguished himself in the attacks that were made on ship money, and on the judges who had pronounced the levying of it legal; and in those which were directed against the church. Indeed, from his first actions and words, he seemed to be as thorough a reformer as the most eminent members of the country party; and his change of position will ever furnish matter for historical students to discuss. Macaulay attributes his change to fastidiousness, which caused him to find reasons against any cause that he espoused. Forster thinks it was owing to his quickness, impetuosity, and impatience, and says his spirit was in all things too much on the surface. His friend Hyde mentions his "notable vivacity;" and he never did things by halves. Be the cause what it may, he left the reform party, and he who had said the bishops were stark mad, and therefore should be sent to Bedlam, was soon heard to complain that they who hated the bishops hated them worse than the devil, and they who loved them did not love them so well as their dinners. Mr. Forster expresses the opinion that Falkland was far more an apostate than Strafford, inasmuch as his heart was really with the parliament from the first, which Strafford's never was; and that he desired peace so ardently only because he was by no means devoted to the cause for which he fought. In the memorable debate on the Grand Remonstrance, Falkland was the second speaker, following Hyde, and against the remonstrance. His course on this occasion, with his earlier opposition to the abolition of the church, had the effect of leading the king to make him the offer of the post of secretary of state, which he accepted, Sir J. Colepepper being made chancellor of the exchequer. To them and to Hyde he committed his affairs, and they wished to govern constitutionally, and would have done so but for the king himself, who broke his pledge to them when he sought to arrest the 5 members. Of the exact part which Falkland had in the government scarcely any thing is known, but he and his two associates began to receive marks of hostility in the commons, and there was a plan formed to seize them, which they prevented by never being all present there at the same time. Falkland wrote the royal answer to the parliament's 19 propositions, and then joined the king at York. He signed the king's declaration that he did not

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mean to make war on the parliament, which was as sincere on his part as it was false on that of the monarch. The 3 ministers advised Charles to return to London, and to appear in parliament before he could be expected; but he would go no further than to allow a second message to be sent to London, one of the bearers of which was Falkland. Shortly afterward Falkland was removed from the commons, and placed on the list of those whom the parliamentary commander was ordered to exclude from mercy. He behaved with gallantry at the battle of Edgehill, and had his advice been taken the king would have won a complete victory. In some negotiations that followed, he labored earnestly for peace. The campaign of 1643 was for a long time favorable to the king, and Falkland accompanied him to Bristol, and thence to the siege of Gloncester. He recklessly exposed himself to the enemy's fire, and perhaps courted death. The advance of the parliamentary army compelled the king to raise the siege. In the first battle of Newbury, Falkland placed himself at the head of Sir John Byron's regiment. Receiving an order to charge a body of foot, he advanced between hedges lined with musketeers, and received a ball in the stomach, from which he died instantly. The body was found the next day, and buried in Great Tew church. He left a wife and 3 sons. Among the best works which treat of him is Forster's "Historical and Biographical Essays" (London, 1858).

FALKLAND ISLANDS (Fr. *Malouines*; Sp. *Malvinas*), a group in the S. Atlantic, belonging to Great Britain, and consisting of about 200 islands, 300 m. E. from the entrance to the strait of Magellan, between lat. 51° and 53° S., long. 57° and 62° W.; area, about 6,000 sq. m.; pop. in 1855, 420. All but two are very small. East Falkland is about 90 m. long, 40 m. broad, and 3,000 sq. m. in area; West Falkland, separated from the former by a channel from 2½ to 18 m. wide, called Falkland sound, is 80 m. long, 25 m. broad, and about 2,000 sq. m. in area. The other principal islands are Great Swan, Saunders, Pebble, Keppel, Eagle, Weddell, and Lively. The coasts are very irregular, in some places rocky and precipitous, in others low. Bays and inlets are numerous, and East and West Falkland are nearly divided by several deep indentations. There are few rivers, the San Carlos, 30 m. long, discharging itself off the N. W. coast of East Falkland, being the largest. There are many fresh water ponds and brooks. The surface of the islands is broken by ridges of bleak hills, the highest of which are in East Falkland, though the average elevation of West Falkland is greater than that of the former. Mount Usborne, one of the Wickham hills, in the E. island, is 2,300 feet above the sea; the other summits are from 800 to 2,000 feet high. The country south of the Wickham hills is a level plain. The whole aspect of the group is dreary and uninviting. The commonest geological formation is quartz, which in some places is seen covering the bottoms of the valleys, broken into sharp fragments, and disposed in level sheets or streams like rivers of stone. Sandstone and clay slate also occur. The soil of such portions as have been explored is mostly peat or sandy clay covered thinly with vegetable mould. The valleys of the streams are exceedingly rich. The climate is like that of England, but more equable. The temperature of summer ranges from 45° to 70° F., and that of winter from 30° to 50° F. The mean temperature of the year is 47°. Severe and destructive snow storms are occasionally experienced. There are no trees on the islands. The most important production is grass, which grows to a great length and possesses remarkably nutritious properties. A variety called tussock, much prized by graziers, is now becoming scarce. Three or four kinds of bushes are found; the common garden vegetables of England thrive; barley and oats are cultivated, but wheat is raised with difficulty. The fauna comprises the warrah or wolf fox, which is peculiar to this archipelago, and is the only quadruped indigenous to the islands. Other animals have been left here by Europeans, and the number of wild cattle sprung from stock thus introduced in East Falkland alone is estimated at 35,000 or 40,000. Horses, sheep, wild hogs, rabbits, seals, and wild fowl are found, and many French and American vessels are employed in whaling off the W. coast of W. Falkland. There is little commerce, the exports consisting of hides, tallow, salted beef, seal skins, and fish oil, and the imports of timber, lime, bricks, flour, sugar, coffee, and British manufactured goods. The value of imports in 1854 was £21,100, and of exports £18,600. The fisheries and the guano deposits on W. Falkland are considerable sources of wealth. A British colony called Stanley has been established at the head of Port William inlet on the N. E. coast of E. Falkland. It has an excellent harbor, and is the only settlement in the whole group. The main object of the British government in keeping up the establishment here is to afford ships a place of call for water and fresh provisions. In 1855, 53 vessels, 10 of which were American and 40 British, touched at the port. The islands were discovered by John Davis, Aug. 14, 1592, and were visited by Strong in 1690, who called the sound mentioned above Falkland, and the islands afterward took the same name. The French planted a colony on Berkeley sound, East Falkland, in 1764, and the English established themselves at Port Egmont, West Falkland, 2 years later. The French in 1767 ceded their settlement to the Spaniards, who drove away the English in 1770. They afterward restored Port Egmont to the British, and some time later the islands were abandoned by both parties. Buenos Ayres took possession of East Falkland in 1820 and founded a colony there in 1823, but subsequently gave it up to the British.

FALL OF BODIES. See GRAVITY.

FALL RIVER, a city and port of entry of Bristol co., Mass., situated on Mount Hope bay, an arm of Narraganset bay, at the mouth of

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Taunton river, 53 m. S. S. W. from Boston; pop. in 1855, 12,680. Fall river, from which it is named, is a small stream rising in a chain of ponds connected by a narrow channel, and covering an area of 5,000 acres. They lie about 2 m. from the bay, and receive the outlets of several other sheets of water which embrace an area of 2,000 acres more. The river which carries off the overflow of these ponds has a descent of 130 feet in less than half a mile, and joins the Taunton near its mouth. Its remarkable advantages as a mill stream have been increased by building a dam at the outlet of the ponds, which gives the water an additional fall of about 2 feet, and its lower banks are entirely built up with manufactories. The water power never fails, and damage is rarely if ever done by freshets. The city stands on high ground, with well shaded streets, handsome churches, and many granite buildings, the stone being obtained from large quarries in the neighborhood. The granite is of excellent quality, and was used in constructing the fortifications at Newport. The city is lighted with gas, and in 1858, beside a handsome granite town house and market, contained 18 churches (2 Baptist, 3 Christian, 2 Congregational, 1 Episcopalian, 1 Freewill Baptist, 1 Friends', 3 Methodist, 1 Presbyterian, 1 Roman Catholic, 1 Swedenborgian, 1 Unitarian, and 1 Universalist), a high school, an athenæum, 2 weekly newspaper offices, 4 banks with an aggregate capital of $1,250,000, and 2 savings banks. It is eminently a manufacturing place, its industrial activity being devoted chiefly to the production of cottons, linens, printed calicoes, iron ware, and machinery. The following table shows the state of manufactures in 1855:

Articles manufactured.	No. of establishments.	Value of manufactures.	Capital.	No. of hands employed.
Cotton and cotton yarn..	8	$1,229,250	$..365,000	1,711
Calico, printed.....	2	1,330,000	230,000	850
Linen	1	240,000	365,000	550
Iron ware, iron, and nails	4	731,600	355,000	424
Machinery	3	200,000	105,000	150
Brass	1	14,000	6,000	7
Coaches, wagons, &c....	3	24 000	13,000	30
Soap	2	50,000	7,500	10
Flour	2	670 000	150,000	36
Gas	1	15,000	40,000	10
Miscellaneous	33	98,,890	79,550	225
Total	62	$4,786,740	$2 716,050	3,508

An establishment for the manufacture of enamelled cloth was commenced in 1857, with a capital of $25,000. Ship-building is carried on to a small extent, and during the year ending June 30, 1858, 4 vessels were launched, having an aggregate burden of 633 tons. The harbor, formed at the mouth of Taunton river, is safe, commodious, easy of access, and deep enough for ships of the largest class. It was at one time in contemplation to make it the site of a government dry dock and naval depot. The registered, enrolled, and licensed tonnage of the port, June 30, 1858, was 14,598, of which 6,991 tons were employed in steam navigation, 13,721 tons were engaged in the coasting trade, and 46 in the cod fishery. The foreign commerce during the same year was as follows: vessels entered, 37, tonnage 6,841; vessels cleared, 19, tonnage 3,396; value of imports, $30,213; value of exports, $5,788. A daily line of steamers connects Fall River with Newport, Providence, and New York, and the Old Colony and Fall River railroad gives it communication with Boston. Fall River was formerly a part of Freetown, and was incorporated as a separate township about 1802. Its name was soon after changed to Troy, but in 1834 its old appellation was restored. It received a city charter in April, 1854.

FALLING STARS. See METEORS.

FALLMERAYER, PHILIPP JAKOB, a German historian and traveller, born in Tschötsch, near Brixen, in the Tyrol, Dec. 10, 1791, served as a sub-lieutenant in the Napoleonic wars of 1813–'15, after which he became a professor at the college of Augsburg and the lyceum at Landshut. From 1831 to 1836 he travelled in the Orient, resided in the southern part of France for 4 years, made a second tour through Asia Minor in 1840, published the results of his ethnological and historical researches in *Fragmente aus dem Oriente* (2 vols., Stuttgart, 1845), visited Palestine and Syria in 1847, was a member of the German parliament in 1848, obtained a professorship at the university of Munich, but was dismissed in 1849 on account of his liberal views, and has since then led a retired life at Munich. The most important of his historical writings are: *Geschichte des Kaiserthums Trapezunt*, "History of the Empire of Trebizond" (Munich, 1831), and *Geschichte der Halbinsel Morea im Mittelalter*, "History of the Peninsula of Morea during the Middle Ages" (2 vols., Stuttgart, 1830–'36). In this work he maintains that the present inhabitants of Greece have little or no affinity of race with the ancient Hellenes, but are chiefly a branch of the Slavic family. Many of his essays published in the Augsburg *Allgemeine Zeitung* belong to the best writings of their kind which have ever appeared in Germany. His works exhibit a rare combination of profound scholarship and philosophical depth with the faculty of presenting the results of scientific researches in a perspicuous and graceful form.

FALLOPPIO, or FALLOPIUS, GABRIELLO, an Italian anatomist, born in Modena about 1523, died in 1562. He was one of the 3 naturalists who, according to Cuvier, contributed to the revival of the study of anatomy in the 16th century, the other 2 being Vesalius and Eustachi. He was a pupil of Vesalius, and after travelling through the various countries of Europe, he was for a time professor of anatomy at Ferrara, and afterward for several years at Pisa. In 1551 he was appointed to succeed Vesalius as professor of anatomy and surgery at the university of Padua, where he also devoted himself to the study of botany, and became director

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of the botanical garden. He published in 1561 his principal work, entitled *Observationes Anatomicæ*, which was one of the best anatomical treatises of his century, and has been several times reprinted. He gave an exact description of the structure of the ear, one of the canals of which still bears his name. He also first indicated the use of the 2 ducts extending from the womb to the ovaria, on each side of the fundus, which are called from him Fallopian tubes. After a short but brilliant career, in which he became distinguished as a professor, botanist, and surgeon, as well as anatomist, he died and left his chair to Fabricius, his pupil.

FALLOUX, Frédéric Alfred Pierre, vicomte de, a French author and statesman, born in Angers, May 11, 1811. He first made himself known by a history of Louis XVI. (Paris, 1840; 2d ed., 1843), and by his *Histoire de St. Pie V.* (2 vols., Paris, 1844; 3d ed., 1858), the former of which showed his legitimist, the latter his Catholic sentiments. In 1846 he was elected a member of the chamber of deputies, where he took his seat among the legitimists. After the establishment of the republic he warned the inhabitants of La Vendée against civil war, and exhorted them to have confidence in the new government. On Dec. 20, 1848, he was made by Louis Napoleon minister of worship and public instruction, which post he resigned in Oct. 1849, on account of his health. After the *coup d'état* of Dec. 2, 1851, he refused to be a candidate for the legislature, and retired from public life. In 1855 he became assistant editor of the *Correspondant*, the leading review of the Catholic party. In this capacity he took an active part in the violent controversy which the *Correspondant*, in the name of the moderate section of the Catholic party, sustained against the *Univers* daily newspaper. Falloux published on behalf of his friends the pamphlet *Le parti Catholique*. He succeeded M. Molé as a member of the French academy (March 26, 1857), and published in the same year *Souvenirs de charité*.

FALLOW DEER. See Buck, and Deer.

FALLS, a central co. of Texas, intersected by Brazos river and drained by many small creeks; area, 795 sq. m.; pop. in 1858, 2,875, of whom 1,225 were slaves. Most of the surface is occupied by rolling prairies, the soil of which is a rich black loam, adapted to wheat and other varieties of grain. The river bottoms are still more fertile, and produce good crops of Indian corn and cotton, with plenty of oak, pecan, cedar, cottonwood, and other timber valuable for building purposes. Limestone underlies a large part of the county, and a vast ledge of it crossing the bed of Brazos river causes the falls from which the county derives its name. Formed from Milan and Limestone counties in 1850. Value of real estate in 1858, $153,512. Capital, Marlin.

FALMOUTH, a parliamentary borough and seaport of Cornwall, England, beautifully situated on the S. W. side of a harbor on the channel, at the mouth of the river Fal, 45 m. S. W. of Plymouth; pop. in 1851, 4,953. It is built on a steep acclivity, reaching to the water's edge, and consists mainly of one long narrow street. It has many good stone houses, and a plentiful supply of water in the N. and S. quarters, where the ground is arranged in terraces. The harbor is one of the finest in Great Britain, and may be entered at all times. It is defended on the W. by Pendennis castle, and on the E. by St. Mawes castle, both built by Henry VIII., and improved by Elizabeth. In 1644 Pendennis castle afforded shelter to the queen Henrietta Maria when embarking for France, and in 1646 to Prince Charles on his departure for Scilly. It underwent a long siege by Cromwell, traces of whose encampment near by are still visible. The castle now contains barracks, storehouses, magazines, &c. An obelisk in the grounds of Lord Wodehouse's estate (Arwinick, once the seat of the ancient family of Killigrew), adjoining the town, is dedicated to the memory of Sir Walter Raleigh, who visited the harbor in the reign of Elizabeth on his return from the coast of Guinea, and first called attention to its great advantages, which had till then been altogether overlooked. There is a good quay, accessible by vessels of heavy burden. The entrance is about 1 m. wide, and the bay, which runs 6 or 7 m. inland, is a favorite resort of British vessels in time of war. Before the introduction of mail steamers it was a principal station for the Spanish, Portuguese, and American packet service, and carried on an extensive trade with those countries. It is still the only bonding port for tobacco, except Plymouth, in Devonshire and Cornwall. It exports pilchards, which are taken off its coast, tin, and copper, and imports timber, hemp, tallow, rum, sugar, grain, wine, and fruits. It has large ship-building yards, roperies, breweries, and a flourishing trade in maritime supplies. The number of vessels registered as belonging to the port in 1856 was 118, tonnage 11,159; number of vessels entered during that year 940, tonnage 85,970; number of vessels cleared 839, tonnage 25,517. The royal Cornwall polytechnic society, the first institution of the kind established in England, founded in 1833 for the encouragement of the sciences, art, and industry, meets annually at Falmouth.

FALSE IMPRISONMENT. The jealous watchfulness of the common law of England for the protection and preservation of personal liberty is nowhere proved more distinctly than in the provisions of the law respecting what is technically called false imprisonment. They are in their extent and fulness quite peculiar to that law; and while the principles on which they rest, and some of the rules derived from them, may be discerned even in the Saxon times, they have certainly been developed and systematized in later ages, as the worth of personal liberty became more accurately estimated and the means of preserving it better understood. False imprisonment, in the law of England and the Unit-

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ed States, may now be defined as any intentional and unlawful restraint of a person. As to the kinds of false imprisonment, it may be: 1, the restraint or arrest of a person under color of law, by means of an illegal or insufficient process; 2, such restraint or arrest, by means of a legal instrument, but at an illegal time, as on Sunday or any other day generally prohibited, or at any time which is illegal and unauthorized in respect to the person restrained; 3, without color or pretence of law, as when one confines another to his room or house without legal authority to do so. False imprisonment may be with force or wholly without force; as if one, without touching another, by words only, or even by gestures only, compels him, by fear, to abstain from going where he has a right to go, or to go where he wishes not to go and is under no obligation to go. It is false imprisonment to confront a man in the street, and, without touching him, constrain him to arrest his course or change it against his will.—The remedies for false imprisonment are threefold: 1, an action for trespass *vi et armis*, when the party imprisoned may recover damages, including, if the jury see fit, not only compensative damages, but perhaps exemplary damages, to deter the guilty party and others from a repetition of the offence; 2, the writ of *habeas corpus*, or of replevin; 3, false imprisonment of any kind is an offence at common law, for which the guilty party may be indicted, and on conviction severely punished; and in some of the United States there are various statutory provisions respecting certain kinds of false imprisonment.

FALSE PRETENCES. Any one who acquires property by means of false pretences has no legal title to it, and it may be recovered by the party from whom it was thus obtained, and who is still the legal owner. (See FRAUD.) But beside this civil remedy the statutes of England and of the United States make the obtaining of property by false pretences an indictable offence. The expressions in our state statutes are various; in general, however, any one who by means of false pretences, and with a fraudulent design, obtains possession of money, merchandise, goods, or wares of any description, becomes liable under the statute. It has been held in New York, under its statute, that obtaining a party's signature to or an endorsement of a note by false pretences was an offence within the statute. It is impossible to define precisely the false pretences which expose one to this punishment. It is obvious that they cannot be slight suggestions which are without foundation, or open and obvious falsehoods by which no man in his senses would be deceived. They must be, in the first place, intended to produce an injurious effect; and in the next place, they must be such as would be likely to deceive a person of ordinary discretion, who is to a reasonable extent on his guard. If the pretences or misrepresentations are numerous, and most of them are honest, but some one of them is at once material, false, and fraudulent, the offence is committed; and this is so, although the statements which were true exercised the principal influence in obtaining the property for the guilty party, provided it would not have been given him but for the statement also which was false. It may be remarked that no false pretences made after the contract was completed will constitute the offence, even if they were made before the property was delivered, unless the delivery or execution was at first withheld, and then brought about by the false pretences. At common law the nearest provision to this of the modern statutes was one which exposed to indictment and punishment as a cheat a person who obtained possession of money or goods by means of what were called false tokens, by which was meant forged papers, or other counterfeit symbols or evidence of ownership or authority. Language similar to this ancient rule is used in some of our statutes, as in those of Pennsylvania. The first statute against false pretences in England was 30 George I., ch. 24; and this has been followed by the different states of the Union, more or less exactly. The most common instances of indictments under these statutes are for the obtaining of goods by buyers under false pretences as to their responsibility or resources; and it was mainly to suppress these that the statutes were intended.

FALSETTO, an Italian word signifying a little false, and applied in music to that high register of a man's voice which resembles a female's, and is therefore not strictly his own, but a false or assumed voice. It extends about 4 or 5 notes above the natural voice.

FALUN (Sw. *Fahlu*), a Swedish province, including Dalecarlia, bounded N. by Ostersund, E. by Gefleborg, S. by Wästerås and Oererbo, W. by Carlstad and Norway, comprises part of the S. mountain region of Sweden and a part of the famous copper mine region, whence it is also called Kopparbergs-Laen, or copper mountain province; area about 12,000 sq. m.; pop. in 1855, 158,755. Almost the whole province belongs to the basin of the Dal, which drains it directly by the E. and W. Dal, and by many tributary streams. Cultivation is chiefly confined to the valleys, which are rocky, and better adapted for pasture than for agriculture. The N. produces only hay, but rye, barley, and oats are produced in the S. and S. E.; potatoes are much cultivated, and butter and cheese are made in considerable quantities. But the chief wealth of the country proceeds from its wood, which furnishes timber, fuel, potash, and rosin, and from its copper and iron mines and various quarries, especially of porphyry, which is made into many very beautiful articles. The lakes (the principal of which, Lake Siljan, covers 50 sq. m.) and rivers abound with fish. Mr. Brace, in his "Norse-folk" (New York, 1857), speaks in the highest terms of the excellent moral and industrial character of the people.—FALUN, capital of the above province, is situated on the W. shore of Lake Runn, 130 m. from Stockholm, 73 m. from Gefle, in about lat. 60° 35′ N., long. 15° 35′ E.; pop. in 1855,

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4,618. The houses are low and almost entirely of wood. The copper mines situated W. of this town are among the oldest and most celebrated in Europe. The mines produced in former times upward of 3,000 tons, but declined to 1,900 tons in 1690, to 1,230 in 1716, and now hardly exceed 400 tons annually. The external opening, made by the falling in of ancient galleries, is about 300 feet deep, and 1,200 feet long by 600 wide. The descent to the bottom of this is by easy stairs, whence steep ladders lead to the pits, the lowest of which are about 1,300 feet from the surface. The excavations extend many miles under ground, forming several magnificent chambers, where banquets were given to Bernadotte and his queen, and Prince Oscar (the present king), on which occasions the mines were brilliantly illuminated. The region about Falun is associated with the wanderings and adventures of Gustavus Vasa, but the statement that he had worked in the mines has been contradicted by the later Swedish historians. According to Geijer, his experience as a laborer was confined principally to the threshing flail and woodman's axe. The mines are owned by a company of 300 shareholders, and the same company has the monopoly of iron and other works in the vicinity. Beside copper, small quantities of gold, silver, and lead are obtained from the ore. Connected with the mines are a school of practical mining, a model room, a large scientific library, and a mineral and geological museum.

FALUNS, in geology, a term used by Lyell to designate a group of miocene strata in the valley of the Loire, which abound in corals, shells, and other marine fossils. The word was provincial with the agriculturists of Touraine, being applied to the materials of these beds, which they used for fertilizing the soil.

FAMAGOSTA, or Famagusta (anc. *Arsinoë*), a city on the E. coast of the island of Cyprus, 18 m. from Nicosia. Its walls, fortresses, towers, and edifices are now in ruins, and its harbor blocked up with sand; and it contains not more than 200 inhabitants. This city was founded by Arsinoë, sister of Ptolemy Philadelphus, king of Egypt. It was fortified by Guy de Lusignan, who was crowned king of Jerusalem in the 12th century. It was taken by the Genoese in 1372, and by the Venetians in 1489, under whose rule it became one of the principal commercial cities of the Levant, and received new fortifications. It sustained a memorable siege in 1571, by Selim II., by whom it was taken and nearly destroyed, and an earthquake in 1735 completed its ruin.

FAMILIAR SPIRITS. See Demons.

FAMILY, a natural division of animals or plants, characterized by their form as determined by structural peculiarities. In order to arrive at the precise signification of the term as at present understood, it will be well to define the higher animal groups. Taking then the animal kingdom, the highest division is that introduced by Cuvier, the 4 great groups or branches of *radiata*, *articulata*, *mollusca*, and *vertebrata*, characterized by 4 different plans of structure. Below these are the classes; in the vertebrates, for instance, the fishes (divided into 4 by Agassiz), amphibians, reptiles, birds, and mammals; these are characterized by the manner in which the vertebrate plan is carried out, as to the ways in which life is maintained and the different means employed in establishing those ways. The classes are divided into orders; for instance, the mammals are placed by Agassiz under 8 orders, *marsupialia*, *herbivora*, and *carnivora*, characterized by the degree of the complication of their structure within the limits of the class. Orders are divided into families, characterized, as above stated, by their form as far as determined by structure; and below these come genera and species. By form here must not be understood different figures having a common character, as expressed by the radiated form, for example, of the lowest branch of the animal kingdom, the word in this case evidently meaning plan; as far as mere form is concerned, a holothurian resembles a worm more than it does a star-fish, yet the first and third belong to the same class of radiates, while the second belongs to the branch of articulates. As form is not characteristic of branches, neither is it of classes in the animal kingdom; the whale in form resembles a fish more than a mammal, the bat is like a bird, the eel is like an ophidian reptile; yet the whale and the bat belong to the class mammalia, and the eel to the class of fishes. To begin at the other end of the scale of divisions, and using form in the sense of definite figure, as commonly applied to man and well known animals, it will be seen that it is not a characteristic of species nor genera; the numerous species of monkeys, cats, seals, bats, porpoises, owls, parrots, humming birds, gulls, ducks, tortoises, snakes, lizards, frogs, sculpins, and sharks, to say nothing of invertebrates, could not be distinguished from each other by their forms alone; in like manner the different genera of natural families do not vary appreciably in their general form, as will be conceded on examining the genera of the *ursida*, the *phocidæ*, the *falconidæ*, the *fringillida*, the *chelonidæ*, the *geckotidæ*, the *colubridæ*, &c. Ascending to orders, what similarity of form is there between the kangaroo and the ornithorhynchus, the elephant and the hog, the cat and the seal, the ostrich and the grouse, the tortoise and the sea turtle, belonging respectively to the same orders in their classes? In all systems of zoology we find animals grouped together under divisions terminating in *idæ* or *ina*, which are the nearest approaches to natural families. The terminations *idæ*, *oidæ*, and *ina* are used promiscuously by authors as indicating families, and in many cases in defiance of the rules of etymology. For instance, in *ursidæ*, *equidæ*, and *bovidæ* we have a Greek termination to a Latin root; in such cases the termination *ina* should be substituted, making *ursina*, *equina*, *bovina*; on the other hand, *delphinidæ* and *elephantidæ*

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would be proper, being wholly Greek. Though it would be of advantage in most respects to correct such errors, it would introduce considerable confusion by having some family names ending in *ina* and others in *idæ*, the latter being in some cases unquestionably the best. The former termination also has been employed by Gray and other systematists to express divisions intermediate between families and genera, or sub-families; as *felina*, *canina*, *mustelina*. According to the rule of Prof. Agassiz, however, the latter would represent families eqnivalent to the *felidæ* of most naturalists. From the conflicting opinions of naturalists on what shall constitnte ordinal and family characters, the confusion is very puzzling to the student; hence the importance of adopting definite characters for the separation of the divisions of animals. Prof. Agassiz, in his "Essay on Classification" (chapter ii.), has endeavored to introduce order into the zoological chaos, and with far greater success than any of his predecessors; the definitions here presented are taken from his work, and, if they could command the general consent of naturalists, would soon lead the way to a natural classification of animals. The first glance at an animal, which gives us an impression of its form, affords a very correct idea of its family relationship, whether a deer, a squirrel, a pigeon, a duck, a crocodile, a frog, or a shark; it is not the mere outline, however, which is characteristic of families, but the form as determined by the peculiarities of internal structure. Among families may be mentioned as examples the *cebidæ* or American monkeys, *felidæ* or cats, *ursidæ* or bears, *phocidæ* or seals, *balænidæ* or whales, *leporidæ* or hares, *bovidæ* or oxen, *equidæ* or horses, and *elephantidæ* or elephants. On this principle, taking cryptogams and dicotyledons as 2 of the 4 branches of the vegetable kingdom, *algæ*, lichens, and ferns would be examples of classes; *diatomaceæ* and *fuci* of orders; and palms, *coniferæ*, *compositæ*, &c., of natural families. There must also be admitted some intermediate divisions into a natural zoological classification, based upon cases of special development of certain systems of organs, which will require the establishment of sub-orders, sub-families, sub-genera, and perhaps sub-species or varieties.

FAN, an implement used to produce coolness by agitating the air. Its origin is to be traced to remote antiquity, and is ascribed by some historians to Kan-si, daughter of a Chinese mandarin, and by others to the sibyl of Cumæ, who is said to have used a fan during the delivery of her oracles. But long before the days of the sibyl the artists of Egypt painted the fan, and on the walls of the tombs at Thebes, the king is represented surrounded by his fan-bearers, who bore the instrument as standards in war, while in times of peace they waited upon the monarch in the temple, refreshing him with the fans, and at the same time driving away the insects from the sacred offerings. The fashion spread from Persia to Judæa, and in Greece we find traces of fans as early as 500 B. C. The wings of a bird joined laterally and fastened to a delicate handle constituted a fan of most beautiful appearance. The fan of the priest of Isis, at the time when the worship of that divinity began to prevail in Greece, was in the form of a semicircle, made of feathers of different lengths, pointed at the top and waved by a female slave. In one of the tragedies of Euripides a eunnch is introduced, who states that, in accordance with Phrygian custom, he had used his fan for the purpose of protecting Helena against the effects of the heat. In Rome fans became popular among the ladies, and were used at dinner parties, where slaves with fans stood behind their guests. The Roman poets, Ovid, Terence, and Propertius, frequently allude to their use, and the pictures upon the ancient vases also indicate the wide prevalence of the fashion. Among the relics of Queen Theodolinda (who was married in 588 to Autharis, king of the Lombards), in the cathedral of Monza, is her fan, or *flabellum*, of painted leather, with a massy metallic handle enamelled. In the middle ages, the fans made of eagle or peacock feathers, in various forms, and fastened with a handle of gold, silver, or ivory, were a lucrative article of trade in the Levantine markets, whence they were exported to Venice and other Italian cities. Catharine de' Medici introdnced them into France. The fan which she brought could be folded in the manner of those of the present day. After having been favorably received by the court of Henry II., they became objects of great luxury during the reigns of Louis XIV. and Louis XV. No toilet was considered complete without a fan, the cost of which frequently exceeded $70. Picturesque landscapes, the most exquisite paper of China, the most elegant taffeta of Florence, precious stones and diamonds, all were in turn put in requisition to enhance the appearance and the value of the fan. One of the ladies of the court of Louis XV. wrote of it in ecstasy to one of her friends: *Il y a tant de façons de se servir de ce précieux colifichet, qu'on distingue par un coup d'éventail la princesse de la comtesse, la marquise de la roturière. Et puis, quelles grâces ne donne pas l'éventail à une dame qui sait s'en servir à propos! Il serpente, il voltige, il se resserre, il se déploie, il se lève, il s'abaisse, selon les circonstances.* ("There are so many ways of using this precious toy, that by a stroke of the fan one may distinguish the princess from the countess, the marchioness from the parvenue. And then, how much grace does a fan lend to a lady who knows how to use it skilfully! It winds like a serpent, flntters like a bird, folds and unfolds, rises and droops, according to circumstances.") Mannfactnrers of fans soon became numerons in Paris; and even previous to 1673, when a charter was granted to them by Lonis XIV., they had organized themselves into a corporation. In England, fans existed in the times of Richard II. and Henry

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VIII. In Shakespeare's "Merry Wives of Windsor" an allusion to fans is made by Falstaff to Pistol. A superb fan set with diamonds was presented to Queen Elizabeth on New Year's day. Among the articles received by Cortes from Montezuma were 5 fans of variegated feathers, 4 of them with 10 and one with 18 rods embossed with gold, and one fan, also with variegated featherwork, with 37 rods plated with gold. In Spain, fans were at an early day special favorites with ladies, and the Spanish lady, as well as the ladies of Spanish extraction in the new world, are inimitable in their management (*manejo*) of the fan (*abanico*). They carry on conversations with it, and a book might be written to explain the code of signals by which they express their feelings with the fan. Benjamin Disraeli says, in "Contarini Fleming": "A Spanish lady with her fan might shame the tactics of a troop of horse. Now she unfurls it with the slow pomp and conscious elegance of the bird of Juno; now she flutters it with all the languor of the listless beauty, now with all the liveliness of a vivacious one. Now, in the midst of a very tornado, she closes it with a whirr that makes you start. Pop! in the midst of your confusion, Dolores taps you on the elbow; you turn round to listen and Catalina pokes you in your side. Magical instrument! In this land it speaks a particular langnage, and gallantry requires no other mode to express its most subtle conceits, or its most unreasonable demands, than this delicate machine. Yet we should remember that here as in the north it is not confined to the delightful sex. The cavalier also has his fan, and that the habit may not be considered an indication of effeminacy, learn that in this scorching clime, the soldier will not mount guard without this solace."—The best and cheapest lacquered fans are produced by the natives of China, chiefly at Canton, Su-Chu, Nanking, and Hang-Chn. Those made of ivory and bone and of feathers are destined chiefly for the European and American markets. The fans which the Chinese use for themselves are of polished or japanned bamboo, covered with paper, and vary in price, according to the quality of the frame and the design of the leaf, from 20 cents to 30 cents per dozen. The state fan which is used on great occasions in China and India at the present day is precisely of the same semicircular form and pointed top which was in fashion among the ancient Greeks. In Japan the fan occupies a most important position. There it is, as it were, the national emblem, and is to be seen on all occasions, among all classes of society, and in the hands of men, women, and children. Where the European takes off his hat in token of politeness, the Japanese performs the same courtesy by waving his fan. In the schools of Japan diligent scholars receive fans in reward for their zeal. A gentleman of Japan, in distributing alms to a beggar, puts the money upon his fan. When a criminal of rank is sentenced to death, his doom is proclaimed to him by presenting him with a fan, and his head is taken off while he bows and stretches out his hand to receive the fatal gift. Fans were used for allegorical purposes in the mythology of Greece, and the Egyptian custom of employing them in temples and for religious purposes has also been perpetuated in the ritual of the modern Greek church, which places a fan in the hands of its deacons. Fans are to this day used in Rome on various public occasions, especially at the *festa di catedra*, when the pope is escorted by two men who hold feather fans with ivory handles in their hands, but without using them. The fan of the dey of Algiers had a historical importance. It is related that on April 23, 1828, when the French consul, M. Deval, called at the palace to present his respects on occasion of the great festival which is celebrated on that day in Algeria, his highness put to him some question about a negotiation then pending between the two countries. The evasive answer of the consul exasperated the dey to such an extent that he made a contemptuous movement with his fan, and (according to some accounts) struck him with it in the presence of the other European consuls, and requested him to leave the country. The dey refusing to give satisfaction for this insult, the French government blockaded Algiers, and the protracted hostilities which ensued, and eventually resulted in the conquest of Algeria, may thus be traced to a stroke of a fan.—Next to China, France is most celebrated for the manufacture of fans, but beautiful fans are also made in the United States, in England, at Brussels, Geneva, Vienna, and at various other places. Fan-making in France presents an interesting instance of the subdivision of labor, no fewer than 20 different manufacturing processes being required to produce a fan which sells for less than 3 cents. They are chiefly manufactured in the department of Oise, give employment to over 1,000 persons, and the annual sales of fans in Paris amount to about $1,000,000. In France, the fan is occasionally used by gentlemen at the theatres, having first appeared on a warm summer evening of 1828, during the representation of *Corisandre* at the comic opera. Hence the name of *Corisandre*, applied in France to fans used by gentlemen. Although fans are employed generally in Spain, Italy, and wherever the season or the fashion commands their use, they are among civilized nations probably at the present day in greatest use in the new world, in Mexico, in Cuba, and all over the West Indies and the United States. The multiplicity of fans gives in warm weather a remarkably picturesque appearance to churches and public assemblies in the United States. During the summer it is common in America to see gentlemen using fans as well as ladies, and in places of public amusement fans are often distributed among visitors.

FANARIOTES, or Phanariotes, the Greeks who reside in the Fanar or Phanar district of Constantinople, and whose ancestors settled there after the capture of that city by Moham-

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med II. (1453). Originally employed as translators of public documents and as secretaries and stewards of distinguished personages, they gradually acquired by their wealth, as well as by their abilities and intrigues, great political, financial, and social importance in Turkey. In the 17th century, under Mohammed IV., the office of dragoman of the divan was for the first time intrusted to a Greek, and has since been uniformly conferred upon Fanariotes. Nicolaos Mavrocordatos, one of the most eminent among them, was appointed hospodar of Moldavia in 1709, and of Wallachia in 1711, and was succeeded in this office by other Fanariote families (Musuri, Ypselante, Callimachi, Sutzo, Maurogeni, Hantzerli, and Karadja), until, more recently, the privilege was confined to only 3 families (Musuri, Callimachi, and Sutzo), and their power in the Danubian principalities was abolished altogether at the Greek revolution of 1821. They were the principal bankers of Constantinople, and as such dispensers of an extensive patronage in the bestowal of public offices. Their influence was great, but their cupidity impaired their reputation. The Greek merchants continue, however, to monopolize the commerce of Constantinople, and many among them are Fanariotes.

FANEUIL, Peter, the founder of Faneuil hall in Boston, an American gentleman of fortune and liberality, born of a French Huguenot family in New Rochelle, N. Y., in 1700, died in Boston, March 3, 1743. The project of erecting a public market house in Boston had already been discussed for some years, when in 1740 Mr. Faneuil offered, at a public meeting, to build a suitable edifice at his own cost as a gift to the town; but so strong was the opposition to market houses that, although a vote of thanks was passed unanimously, the offer was accepted by a majority of only 7. The building was commenced in Dock square in September of the same year, and finished in two years. It comprised a market house on the ground floor, and a town hall with other rooms (an addition to the original plan) over it. In 1761 it was destroyed by fire; in 1763 it was rebuilt by the town; and in 1775, during the British occupation of Boston, it was used for a theatre. In 1805 it was considerably altered and enlarged. During the revolutionary period it was the usual place of meeting of the patriots, and from the stirring debates and important resolutions which were often heard within its walls, it gained the name of the cradle of American liberty.

FANNIN, a N. E. co. of Texas, separated from the Indian territory by Red river, and drained by Sulphur fork of that stream, and by Bois d'Arc creek; area, 900 sq. m.; pop. in. 1858, 8,143, of whom 1,495 were slaves. It consists principally of highly fertile prairie lands, producing grain, cotton, and good pasturage. In 1850 the county yielded 117,462 bushels of Indian corn, 374 bales of cotton, 96,224 lbs. of butter, and large numbers of horses and cattle. There was 1 newspaper office, and the public schools contained 273 pupils. Value of real estate in 1858, $992,080. Named in honor of Col. James W. Fannin. Capital, Bonham.

FANNIN, Col. James W., an officer of the Texan revolution, born in N. Carolina, killed at Goliad, March 27, 1836. He held the commission of captain, when, in Oct. 1835, Gen. Stephen F. Austin, who had just been made commander-in-chief of the Texan forces, appointed him and Capt. Bowie to reconnoitre near Bexar, and select a fit site for a camp. The two officers marched at the head of 90 men to the mission of Concepcion, 1½ m. from Bexar, where, early in the morning of Oct. 28, they were surprised and surrounded by a party of 400 Mexicans. A sharp action ensued, in which the Mexicans were finally driven off after losing 60 men and a piece of artillery, while the Texans had but one of their number killed. Soon afterward the chief command was intrusted to Gen. Houston, who at once promoted Fannin to the rank of colonel of artillery, made him an inspector-general, and ordered him to recruit at Velasco, at the mouth of the Brazos. Meanwhile an unauthorized expedition under Dr. James Grant had marched against Matamoras, on the right bank of the Rio Grande, and measures were taken by the general council of the provisional government to reënforce them. To this course both the government and the commander-in-chief were opposed, and a quarrel followed, which resulted in the deposition of the governor and the virtual superseding of Gen. Houston by the delegation of independent authority to Col. Fannin. The council empowered Fannin, under the title of "agent," to collect and organize a force, to appoint subordinates, and to borrow money. Accordingly he issued a proclamation, Jan. 8, 1836, calling upon volunteers to rendezvous at San Patricio (the nearest Texan settlement to Matamoras), where he expected to meet them, after having effected a junction with Grant at Refugio. On reaching Goliad, however, he received a message from Col. Travis, who, being hard pressed at San Antonio de Bexar by Santa Anna, had retired into the Alamo fort near that town, and unless speedily relieved would be forced to capitulate. With 300 men and 4 guns, Fannin set out for the Alamo 3 days after receiving the message, but an accident which happened to his artillery train induced him to return to Goliad, whence he resumed his march to Refugio. Here he heard of the destruction of Grant's party, and the rapid approach of the Mexicans, whereupon, retracing his steps to Goliad, he proceeded to put that town in a state of defence. On March 18, in obedience to orders from Gen. Houston, who was now acting under a commission from the convention of the newly formed republic, he began to fall back toward Victoria, but was intercepted the next day at the Coleta river by a Mexican force under Gen. Urrea. Hastily throwing up a breastwork of wagons, baggage, and earth, the Texans defended themselves with spirit until night interrupted the

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fighting, Col. Fannin being among the wounded. The battle was renewed on the 20th, but the Mexicans having received a reënforcement of 500 men, with artillery, a capitulation was signed, by which it was agreed that the Texans should be treated as prisoners of war, and as soon as possible sent to the United States. Having surrendered their arms, they were then marched to Goliad, where on the 26th an order was received from Santa Anna requiring them to be shot. At daybreak on the following morning the prisoners, 357 in number (the 4 physicians and their 4 assistants being spared), were marched out of the fort under various pretexts, and fired upon in divisions. Fannin was the last to suffer. Many attempted to escape, and were cut down by the cavalry, but 27 are believed to have eluded pursuit.

FANNING, David, a loyalist and freebooter of North Carolina during the war of the revolution, born of low parentage in Wake co., N. C., about 1756, died in Digby, Nova Scotia, in 1825. He seems to have been a carpenter, but neglected his trade to lead a vagabond life, trafficking with the Indians, and being connected for some time with the notorious Col. McGirth on the Pedee. When Wilmington was occupied by the British under Major Craig in 1781, Fanning, having been robbed by a party of men who called themselves whigs, attached himself to the tories, collected a small band of desperadoes, and, mounted on a horse whose reputation soon equalled his own, scoured the country at the head of his followers, laying waste the settlements and committing frightful atrocities, but doing such good service to the British that Major Craig rewarded him with the royal uniform, and gave him a commission as lieutenant-colonel in the militia. He now extended his operations. By the rapidity and secrecy of his movements he succeeded in capturing many prominent whigs, whom he either conducted to the British headquarters, or, if they had incurred his personal resentment, hung upon the nearest tree. At one time, having collected 30 or 40 men, he dashed into the village of Pittsborough, where a court was then in session, and carried off the judges, lawyers, officers, and some of the citizens; 3 weeks later he captured Col. Alston and about 30 men in his own house; a few days after he made a descent upon Campbellton, and this exploit was soon followed by a similar one at Hillsborough, when he took prisoner Gov. Burke with his whole suite and a number of the principal inhabitants. His name was a terror to the whole country; he was excepted in every treaty and enactment made in favor of the royalists, and was one of the 3 persons excluded by name from the benefits of the general "act of pardon and oblivion" of offences committed during the revolution. On the other hand, his romantic mode of life and personal daring, displayed many times in battle, drew around him numerous followers, whom he disciplined with great strictness. He is said to have commanded at one time a force of 200 or 300 men. When the whigs began to gain the ascendency in North Carolina, he went to Florida, and afterward to St. John's, N. B., where he assumed a respectable deportment, and became member of the assembly. About 1800, however, he was sentenced to be hanged for rape, but escaped from prison, and afterward received a pardon. The close of his life was passed in infamy.

FANNING MACHINE (called in England a winnower, and in the U. S. patent office reports a fanning mill, fanning machine, grain winnower, or winnower, indiscriminately), a contrivance for separating grain from the chaff and dirt with which it comes from the threshing machine. It consists of a frame surmounted by a hopper for the delivery of the grain to a series of vibrating sieves, through which it falls in a shower more or less broken by the number, texture, and vibration of the sieves, as it is being subjected to an outward current of air caused by the revolution of a system of radial fans arranged on a shaft in the rear and lower section of the framework. This machine was first introduced into England from Holland in the early part of the 18th century, and it is not known to have been used in the United States prior to its manufacture by Mr. David Byram of Dutchess co., N. Y., in 1780.

FANO, a seaport and episcopal town of the Papal States, on the Adriatic, near the mouth of the Metauro, 29 m. N. W. of Ancona; pop. 6,860. It is surrounded by old walls, built by the emperor Augustus, in whose honor was erected here a triumphal arch of white marble which is still standing. Few cities of central Italy surpass it in artistic treasures or richness of the surrounding soil and scenery. The cathedral is adorned with 16 frescos by Domenichino, representing events in the life of the Virgin. Many of the 13 other churches, and several public buildings and private mansions, contain paintings by the great Italian masters, marbles, statues, and fine monuments. There are numerous convents, a Jesuits' college, a public school, and a library. The manufactures are chiefly of silk stuffs and twist, and the trade is in corn, oil, &c. The port was once much frequented, but is now choked up with sand, and visited only by small coasting vessels. Fano occupies the site of the ancient Fanum Fortunæ, so called from a temple of Fortune built by the Romans, and commemorative of their victory over Hasdrubal on the river Metaurus, in the 2d Punic war. It was the scene of a victory by Narses over the Goths under Totila.

FANSHAWE, Sir Richard, an English poet and diplomatist, born at Ware Park, Hertfordshire, in June, 1608, died in Madrid, June 16, 1666. He studied in Jesus college, Cambridge, and in the Inner Temple. Abandoning the law for literature, he went abroad to study manners and languages, and on his return home became secretary to the embassy at Madrid, where he remained till 1638. Upon the outbreak of the civil war, he declared for the crown, and was

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made secretary to the prince of Wales. In 1648 he was appointed treasurer to the navy under Prince Rupert, and 2 years later he was made a baronet, and was sent to Madrid to represent to Philip IV. the necessitous condition of his sovereign, and to implore the assistance of Spain. He was taken prisoner at the battle of Worcester, but being released passed several years in retirement, translating the "Lusiad" of Camoëns, and upon the death of Cromwell joined Charles II. at Breda. He was appointed master of requests and Latin secretary to the exiled monarch, and after the restoration was elected one of the representatives of the university of Cambridge in parliament, and was sent upon diplomatic missions to Madrid and Lisbon, in which he negotiated the marriage of Charles with the infanta Catharine of Portugal. Beside his version of the "Lusiad," he wrote a translation of the *Pastor Fido* of Guarini and of the "Odes" of Horace, and a few short original poems. The "Original Letters and Negotiations of Sir Richard Fanshawe, the Earl of Sandwich, the Earl of Sunderland, and Sir William Godolphin" (8vo., London, 1724), is a valuable contribution to history. The "Memoirs of Lady Fanshawe," written by herself, with extracts from the correspondence of her husband, edited by Sir N. H. Nicolas, was published in London in 1830.

FANT, Erik Mikael, a Swedish historian, born at Eskilstuna in Sudermanland, Jan. 9, 1753, died in Upsal, Oct. 23, 1817. He was educated at the university of Upsal, and passed the greater part of his life there as assistant librarian and professor of history. His most important work is the collection entitled *Scriptores Rerum Succicarum Medii Ævi*, of which, however, he had only completed one volume at the time of his death.

FANTASIA, in music, a species of composition in which the writer gives free play to his imagination, and which deviates accordingly from the ordinary forms of musical composition. Its chief characteristics seem to be sudden thought and immediate execution.

FANTEE, or Fanti, a country of the Gold Coast, W. Africa, bounded N. by Assin and Dubbin, E. by Agoona, S. by the ocean, and W. by Wassaw, lying near lat. 5° 30′ N., long. 1° W. It is watered by several rivers, is said to be fertile and populous, and has several important trading stations along its coast. The inhabitants are remarkably cleanly in their persons, are more muscular than the Ashantees, and may be distinguished from other African tribes by small scarifications on the back of the neck and the upper part of the cheek bones. Their heads are high and round, and their color is a dull brownish black. The dress of both sexes consists of a single piece of cloth wrapped loosely around the body. They pay a nominal obedience to chiefs called cabooceers, beside whom every village has its local magistrate. They formerly governed or influenced a seaboard district extending about 100 m. along the coast. About 1807, becoming involved in a war with the king of Ashantee, they obtained the active interference of the English, who had a small fort in one of their towns; but this alliance, while it plunged the British into a disastrous quarrel, proved of no benefit to the Fantees, whose territory after a long struggle was formally added to the Ashantee empire. (See Ashantee.)

FARADAY, Michael, an English chemist and natural philosopher, born in London in 1794. The son of a smith, he received but little instruction in his youth, and was apprenticed to a book-binder. His tastes were averse to the trade, but led him to the study of books, the construction of machines, and the performance of chemical experiments. Hearing a course of lectures by Sir Humphry Davy in 1812, he sent to him a copy of the notes he had taken, and requested his assistance to enable him "to escape from trade and to enter into the service of science." Davy received the application favorably, and in March, 1813, appointed Faraday chemical assistant in the laboratory of the royal institution. In the autumn of the same year Faraday, as secretary and scientific assistant, accompanied Davy in travelling, which was continued till April, 1815. He then returned to the royal institution, with which he has ever since been connected, becoming professor of chemistry in 1833. His earlier researches were eminently of a practical character. He investigated the manufacture of steel and the character of its alloys with silver and platinum. In 1827 he published the first edition of the work on "Chemical Manipulation," of which the 2d edition appeared in 1836. It contained full descriptions of the apparatus, and was the only practical guide for the various operations of the laboratory. Experimenting upon gases, as carbonic acid and others, which were regarded as permanent in form, he succeeded by employing intense cold and pressure in liquefying and even solidifying them. In 1830 he published a valuable paper "On the Manufacture of Glass for Optical Purposes," and introduced a new variety, which he formed of silica, boracic acid, and oxide of lead. He was early interested in electrical researches, assisting Davy in 1820 in prosecuting those first entered upon by Oersted on the relations of electricity and magnetism; and in 1821 he performed for the first time the remarkable experiment, developing the close connection of those two forces, of causing a magnet floating on mercury to revolve continuously round a conducting wire, and again a conductor to rotate round a fixed magnet. The magnet, still more wonderfully, was made to revolve with great rapidity when an electrical current was passed over half its length. In 1831 the first of the series of papers afterward collected and published in separate form under the title "Experimental Researches in Electricity," appeared in the "Philosophical Transactions." They were continued in this and in other scientific journals, and were finally col-

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lected in 8 vols. 8vo. (London, 1839, 1844, and 1855). They contain the results of series of original and systematically conducted investigations, extended through many years in one of the most obscure fields of physical research; and they abound in brilliant discoveries, the credit of which no one contests with Faraday. The most important of these researches relate to electro-chemical decomposition; the induction of electric currents from other currents and from magnets, leading him to the discovery of magneto-electricity; the influence of the magnet on all bodies, leading to the division of magnetics and diamagnetics, and the optical changes induced by magnetism. His experiments showing that the amount of any compound substance decomposed by an electrical current is proportional to the quantity of electricity employed, and that the elements separated in the same time are in the proportion of their atomic weights, make it highly probable that electricity is the same force as chemical affinity, and that it is generated by chemical action only. The fact which he discovered, that just enough electricity is generated by the oxidation in the battery of one atom of zinc to decompose one atom of water, is additional proof of the same conclusion. He proved, moreover, the identity in the nature of electricity, whether derived from the battery, the frictional machine, thermal or magnetic action, or animal bodies; and explained the wonderful differences in its manifestations resulting from its development in intensity or in quantity. Prof. Faraday holds the highest rank among popular lecturers as well as among original experimenters. He has made it a practice to give lectures one evening in the week not exclusively for the benefit of the classes of the institution; and the interest he has excited in these causes them to be regarded among the attractions of London in the winter season. He makes them interesting by perfect ease and simplicity of manner, while wholly absorbed in his subject, and by his talent of clearly explaining its principles, at the same time that he is skilfully conducting the experiments that illustrate it. Few scientific men have received so many distinctions from learned societies and institutions. They have, however, failed to tempt him from the post into which he was installed by his early patron, or to deprive him of the natural modesty and artlessness of character that secure to him an esteem more desirable than that called forth by the highest talents. The queen of England allotted to him in 1858 a residence at Hampton court, and since 1835 he has received a pension of £300 a year.

FARAFREH, or Ferafra, an oasis in the Libyan desert, Africa, about 100 m. N. N. W. of the oasis of Dakhel. It contains a town with some traces of ancient Greek and Roman structures, and a few small villages. The inhabitants are engaged in the manufacture of cotton yarn, coarse woollen fabrics, and earthenware, and in cultivating various small tracts of arable land.

FAREL, Guillaume, a French reformer, born near Gap, in Dauphiné, in 1489, died in Neufchâtel, Sept. 13, 1565. His friend and instructor Lefèvre d'Étaples is thought to have drawn him toward the new doctrines, and he embraced them with the same ardor with which he had clung to the old. He began to preach at Meaux, returned to Paris in 1523, went thence to Basel the next year, became intimate with Zwingli, Haller, Grebel, and other reformers, quarrelled with Erasmus, and was banished from Basel, all within a few weeks, and then retired to Strasbourg, where he was intimate with Bucer. Preaching afterward at Montbéliard and other places, his intemperate zeal drew him into many troubles, and did some damage to his cause. One day he interrupted a Catholic procession in honor of St. Anthony by snatching the statue of the saint from the priest who bore it and throwing it into the river. To escape the consequences of his rashness he fled, and travelled in Alsace and Switzerland. In 1532, with Antoine Saunier, he represented the reformed churches in the synod convened by the Vaudois of Piedmont at Chanforans, and on his return to Switzerland was invited to a conference with the Catholics at Geneva, where the controversy became stormy, blows were interchanged, and the magistrates had to interfere. He was ordered to leave the city, returned in 1533, was again banished, came back in 1534 with letters from the seignory of Bern, and in 1536 persuaded Calvin to aid him in the organization of the reformed church at Geneva. The party of "Libertines" gaining the upper hand in the election of 1538, Farel and Calvin were banished, and visited Bern, Zürich, and Basel. Farel then proceeded to Strasbourg, and organized the Protestants there amid much opposition. In March, 1543, a body of troops under Claude de Guise fell upon a congregation gathered around him at Gorze in France. Farel was wounded, and narrowly escaped with his life. He then settled as pastor at Neufchâtel. In 1557 he was sent to the Protestant princes of Germany to ask their assistance for the Vaudois, and soon after he incurred the displeasure of Calvin and others by marrying at the age of 69 a young girl. In 1561 he preached at Gap with all the violence of his youth, and was thrown into prison, from which his followers released him. He visited Calvin on his death bed. His writings are numerous, but mostly of temporary interest.

FARINA (Lat. *farina*, flour), the fine flour obtained by grinding and sifting any kind of grain. The name is also applied to the starch obtained from roots and grains. Corn starch is often called farina; and a number of very simple nutritious preparations have been distinguished by this name coupled with some high-sounding epithet.

FARINELLI, Carlo Broschi, an Italian singer, born Jan. 24, 1705, died in Bologna, July 15, 1782. The extraordinary beauty of his soprano voice was attributed to the fact of his having been emasculated. He was a favorite pupil of Porpora, and his brilliant success at the

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principal theatres of Italy justified the high anticipations of that maestro. In 1734 he repaired to London. Porpora had engaged him for the Lincoln's Inn Fields theatre, where he soon created an excitement, to the great detriment of Handel, who was at that time the lessee of the Haymarket. He performed 3 years in England, and netted every year a clear income of $25,000. In France his success was equally great, and the brilliant court of Louis XV. seemed for a time to be completely carried away by the bewitching voice of the Italian singer. In Madrid he exercised such a magnetic influence upon Philip V. that he succeeded in dissipating the melancholy with which that king was afflicted. He became the king's chief favorite, and after his death was similarly honored by Ferdinand VI., while at the same time he received an annual salary of $10,000, under the condition that he should renounce singing in public, and reserve the fulness of his genius for the royal ears. He prevailed upon Ferdinand to organize a theatre in the palace, for which he engaged eminent artists from Italy, and of which he became the director. For nearly 25 years he ruled the court of Spain, not only by the charms of his voice, but gradually by his influence in political affairs. In 1759, on the accession of Charles III., Farinelli fell into disgrace, and 3 years later was ordered to leave the kingdom. He then took up his abode at Bologna, where he used his colossal fortune in building for himself a splendid palace in the vicinity of the town, in which he passed the rest of his life amid the treasures of art and the delights of music.

FARINI, Carlo Luigi, an Italian political writer, born in the Papal States, Oct. 22, 1822, studied medicine in Bologna, became at an early age interested in liberal political movements, and was frequently banished from the Papal States. In 1848 he was appointed by Rossi director-in-chief of the sanitary and prison department in Rome, but removed to Tuscany on the advent of Mazzini; while after the French intervention his purpose of resuming his office was frustrated by the papal authorities. He then went to Turin, where he was cordially received by the Sardinian government, and took a part in the publication of the *Risorgimento*. In 1850 he officiated for 9 months as Sardinian minister of the interior, and afterward became a member of the board of health. He is now (1859) a member of the Sardinian parliament, and conspicuous for his advocacy of liberal constitutional principles. An English translation of his principal work, *Il stato Romano*, which gives a history of the Roman states from 1815 to 1850, has been prepared under the auspices of Mr. Gladstone, and published in London in 1859. He is preparing a history of Italy to serve as a continuation of that of Botta, and in May, 1859, addressed a series of letters to Lord John Russell on Italian affairs which attracted considerable attention.

FARMER, Hugh, an English theologian, born in Shropshire in 1714, died in London, Feb. 5, 1787. He was educated in the academy at Northampton under Dr. Doddridge, and became pastor of a dissenting congregation at Walthamstow, Essex, where he wrote several theological treatises, which were issued after his removal to London in 1761. In his "Inquiry into the Nature and Design of our Lord's Temptation in the Wilderness," published in that year, he argued that the whole scene was but a vision prefiguring the future trials of Jesus in his ministry. In his "Essay on the Demoniacs of the New Testament" (1775), he maintained that they were not really persons under demoniac possession, but that this cause was assigned for their maladies by the popular superstition. In his "Dissertation on the Miracles" (1771), he affirms them to be absolute proofs of a divine mission.

FARMER, John, an American genealogist, born in Chelmsford, Mass., June 12, 1789, died in Concord, N. H., Aug. 13, 1838. After having been for 10 years the teacher of a school, he applied himself to studying the early settlement of New England, and his "Genealogical Register," published in 1829, is thought to contain the names of nearly all the first European settlers in that region. A new and enlarged edition of this work, by James Savage of Boston, is now (1859) passing through the press. Mr. Farmer superintended an edition of Belknap's "History of New Hampshire," to which he added many valuable notes; and he contributed various papers to historical and antiquarian societies, and to periodicals.

FARMERS-GENERAL, in France, financial and privileged associations which before the revolution of 1789 took upon lease various branches of the public revenue, as the imposts upon salt or tobacco, or the town dues. This system of managing the taxes originated in the 13th century, when Philip the Fair, in consideration of certain sums paid to him, several times permitted Lombard bankers and Jews to collect the taxes. The rigors exercised in collecting these imposts, the exactions, cruelties, imprisonments, and even executions, often caused popular rebellions; yet in the reign of Louis XIII. the farmers-general had become a power in the state, and often transferred their own leases to still more unscrupulous subordinates. An association of 40 (afterward of 60) farmers-general was formed in 1720, to which the government for an annual payment of 55,000,000 livres yielded the privilege of levying the taxes on articles of consumption; and on the renewal of this privilege in 1726, 80,000,000 livres annually were paid. In 1774 the farmers paid 135,000,000 francs for this right, and in 1789, 180,000,000, and yet made immense fortunes. Their severity had so exasperated the public mind that one of the first acts of the constituent assembly in 1790 was to suppress their association. In 1794 all the farmers-general then living were brought before the revolutionary tribunal; they were condemned, and of the entire number, 28, including Lavoisier the chemist, were executed May 8, 1794, and the remaining 3 some days afterward.

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FARMINGTON, the shire town of Franklin co., Maine, on Sandy river, 30 m. N. W. from Augusta; pop. in 1850, 2,725. It is abundantly supplied with water power, and contains a number of manufactories. The industry of the inhabitants is also largely directed toward grazing. The principal village, called Centre village, has about 100 dwelling houses, several factories, an academy, a bank, and the county buildings. There are two other villages, called Farmington Falls and Upper village. The town contains 26 public schools and 6 churches, 2 Baptist, 1 Congregational, 1 Methodist, and 2 Union. It was settled in 1776, and incorporated Feb. 1, 1794.

FARMINGTON, a township of Hartford co., Conn., 10 m. W. from Hartford, and 30 m. N. from New Haven; pop. in 1850, 2,630. It lies in the western portion of the alluvial valley extending from New Haven to Northampton and onward. The town contains 3 villages, Farmington village, Plainville, and Unionville. The water power at Unionville is not surpassed by any in the state. Unionville and Plainville are the seats of extensive manufacturing establishments, especially of clocks, paper, &c. The railroad from Hartford to Waterbury and the canal railroad pass through Plainville, and the Collinsville branch through Unionville. Farmington was the first town settled in Connecticut colony, after the 3 original towns of Wethersfield, Hartford, and Windsor.

FARNE, Fearne, or Fern Islands, several small islands and rocks in the German ocean, from 2 to 5 m. distant from the English coast, and nearly opposite Bamborough in the co. of Northumberland. On the largest of them 2 lighthouses have been erected. In rough weather the passage between the isles is very dangerous, and several disastrous shipwrecks, attended with great loss of life, have occurred here.

FARNHAM, Eliza W., an American philanthropist and author, born at Rensselaerville, Albany co., N. Y., Nov. 17, 1815. Her maiden name was Burhans. In 1835 she went to Illinois, and in 1836 was married there to Thomas J. Farnham. In 1841 she returned to New York, and employed herself in visiting prisons and in lecturing to women till the spring of 1844, when she accepted an appointment as matron of the female department of the state prison at Sing Sing, that she might prove the possibility of governing such an institution by the power of kindness alone. She filled that position for 4 years, and met with eminent success. While at Sing Sing she published "Life in Prairie Land," and edited an edition of Sampson's "Criminal Jurisprudence." In 1848 she removed to Boston, and was connected for some time with the institution for the blind in that city. In 1849 she went to California, where she remained till 1856, when she returned to New York, and published a volume entitled "California Indoors and Out." For the next 2 years she devoted herself to the study of medicine. In 1859 she organized a society to aid and protect destitute women in emigrating to the West, and went at different times to the western states with large numbers of these persons. The same year she published a work under the title of "My Early Days." She subsequently returned to California.

FARNHAM, Thomas J., an American traveller, husband of the preceding, born in Vermont in 1804, died in California in Sept. 1848. He was by profession a lawyer, but in 1839 he organized and headed a small expedition across the continent to Oregon. He went to California the same year, and took an active and efficient part in procuring the release of a large number of Americans and English who had been thrown into prison by the Mexican government. In 1842 he published "Travels in Oregon Territory;" in 1845, "Travels in California and Scenes in the Pacific;" and in the same year, "A Memoir of the North-West Boundary Line."

FARO, a river of Africa, an affluent of the Benoowe, discovered June 18, 1851, by Dr. Barth, at its point of junction, about lat. 9° 25′ N., long. 12° 30′ E. The natives informed him that it had its source in Mount Labool, 7 days' march to the south. At its junction it was 600 yards broad, but generally not exceeding 2 feet in depth. The current is extremely violent, approaching a rate of 5 miles an hour, a fact indicating that the mountainous region from which it issues is not far distant.

FARO, or Pharo, a game of chance at cards, said to derive its name from the figure of the Egyptian king Pharaoh, which was formerly upon one of the cards. It may be played by any number of persons, who sit at a table generally covered with a green cloth. The keeper of the table is called the banker. The player is called punter (from Ital. *puntare*), who receives a *lieret* or small book from which to choose his cards, upon which he may at his option set any number of stakes, which are limited in amount in accordance with the capital of the banker. The banker turns up the cards from a complete pack, one by one, laying them first to his right for the bank and then to his left for the punter or player, till all the cards are dealt out. The banker wins when the card equal in points to that on which the stake is set turns up on his right hand, but loses when it is dealt to the left. The player loses half the stake when his card comes out twice in the same stroke. The last card but one, the chance of which the banker claims, but which is now frequently given up, is called *hocly* (a certainty). The last card neither wins nor loses. Where a punter gains, he may either take his money or *paroli;* that is to say, double his chance by venturing both his stake and gains, which he intimates by bending a corner of his card upward. If he wins again, he may play *sept et le va*, which means that after having gained a paroli he tries to win seven fold, bending his card a second time. Should he again be successful, he can *paroli* for *quinze et le va*, for *trente et le va*, and finally for *soixante et le va*, which is the

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highest chance in the game. Faro was formerly in vogue in France, England, and Europe generally, and still retains its popularity in various parts of the world. A variety of this game is also much played by gamblers in the United States. One hundred faro banks are said to exist in the city of New York alone; there are also banks in almost all other American cities. The method of play in the United States is as follows: The dealer, with a large array of cheques at his right hand, representing $1, $5, and $20, and so on upward, takes his seat at the centre of a table with 13 cards, representing a complete pack, affixed to it at convenient distance to mark distinctly the bet placed on each. Persons who wish to play exchange at pleasure money for such amount of cheques as they desire to risk, and place the amount they intend to stake on any particular card upon the table. The dealer then produces a pack of cards and shuffles them (the option of shuffling resting also with any of the players who call for it), has them cut, and then places them in a box, from which one by one he deliberately slides them. The banker loses when the card equal in points to that on which the stake is set turns up on his right hand, but wins when it is on the left. But it is in the power of the player, by placing a small copper on the amount he places on the card, to reverse the chance. This, which is called "coppering," enables the player in fact to bet on whichever card he pleases. The dealer stops between each two cards while new bets are being made as cheques change from one card to another, and thus the game proceeds to the close of the pack, when a fresh deal is made, and the same process is gone through. The bank wins on "splits," which is supposed to be the only odds in its favor, but it possesses others in its superior amount of capital, and in the inclination of most players to stake heavier in the effort to recover back than to support good luck. In Germany the cards are not dealt from a box, but nailed to a pine board and torn off one by one by the dealer. Here the dealer is generally assisted also by one or two croupiers, who attend to the playing and receiving, guarding against errors and shuffling the pack.

FARÖE, Färöe, or Ferö Isles (Dan. *Färöerne*), a group of islands belonging to Denmark, and situated in the Atlantic ocean to the N. of Scotland, about 170 m. N. W. from the Shetland isles, and 350 m. S. E. from Iceland; lat. 61° to 63° N.; long. 6° to 8° W. They are 22 in number, of which 17 only are inhabited; area, 495 sq. m.; pop. in 1855, 8,651. The principal of them are Stromöe, the largest and centre of the group, 27 m. long and 7 m. broad, having about 2,200 inhabitants; Osteröe, 20 m. long and 10 m. broad, pop. about 1,200; Snderöe, Sandöe, Vaagöe, and Bordöe. The others are very small. The Faröe islands are formed by a group of conical elevations. Their coasts are in general very steep, often rising precipitately to lofty heights, or abruptly broken by deep inlets. The whole archipelago abounds with whirlpools and rapids, making its navigation difficult. The islands are covered with basaltic mountains, amid which are numerous little lakes and streams. The most elevated peaks are Skellingsfjeld, on Stromöe, 2,430 feet high, and Slattaretind, on Osteröe, whose height is 2,804 feet. The climate, though mild for so northern a latitude, is extremely moist and variable. Snow rarely lasts for more than 8 days, so that the cattle pass the winter as well as summer in the open air. The furious hurricanes which prevail cause an almost total absence of trees, and peat and coal are used for fuel. The principal wealth of the inhabitants consists in cattle and a peculiar breed of sheep. The native horses are of small stature, but robust and active. The islanders support themselves chiefly by fishing and by bird-catching, prosecuted by scaling the precipitous rocks on the shore. The houses are all constructed of wood, roofed with birch bark obtained from Norway, over which is spread a layer of turf. The principal articles of diet are milk, fish, fowl, mutton, and barley. Bread and salt are luxuries. The population, descendants of the old Northmen, are a vigorous and laborious race, of loyal and religious character. The language is a dialect of the Norse, but the official language is the Danish. It is the custom of the men before attempting to climb dangerous cliffs to bare their heads and sing psalms. The longest day of summer here is 24 hours, and the shortest of winter 4 hours. Monks from the Scottish isles first founded in the Faröe group a few hermitages. In the 9th century fugitive Norway pirates established themselves under Grimr Kamban. The islands became Danish when the Danes conquered Norway in 1380. During the 18th century they were notorious as the seat of smugglers. They were occupied by the English from 1807 to 1814. The administration is composed of a Danish *amtmand* or bailiff, who is commander of the armed force, and a *landvogt*, who is director of the police; and they are represented in the legislatnre of Denmark by a deputy appointed by the king. Commerce with the Faröe islands is a monopoly of government, and Danish ships are permitted to approach them only between May and September. Capital, Thorshavn, on the W. side of Stromöe; pop. about 750.

FARQUHAR, George, a British comic dramatist, born in Londonderry, Ireland, in 1678, died in London in April, 1707. After a brief and irregular career at Trinity college, Dublin, he appeared in his 17th year as a comedian upon the Dublin stage. While performing a part in the "Indian Emperor" of Dryden, he accidentally inflicted a serious wound upon his antagonist in fencing, which caused him to renounce the boards for ever. He went to London in 1696, obtained a commission in the army, and began to apply himself to dramatic composition. He lived gayly and licentiously, and during the 10 years before he sank a victim to anxiety and ill health he produced 7 comedies, superior in vivacity and ease of style, and in clear and rapid development of intrigue, to any

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that had before appeared in England. The last and best of these was the "Beaux Stratagem," which still keeps the stage. He also left a volume of "Miscellanies," consisting of poems, essays, and letters. His works have much of the smartness and indelicacy which was fashionable in his time, but they are written in better language and are less designedly vicious than the plays which preceded the revolution of 1688. He was married to a lady who had deluded him by spreading a report that she possessed a fortune; but he pardoned the deception. He passed a troubled though merry life, and left 2 daughters in indigence, whom in a brief and touching note, written shortly before his death, he recommended to the kindness of his friend the actor Wilks. A complete edition of his works appeared in London in 2 vols. 12mo. in 1772.

FARRAR, JOHN, LL.D., an American mathematician, born in Lincoln, Mass., July 1, 1779, died in Cambridge, May 8, 1853. He was graduated at Harvard college in 1803, and afterward studied divinity at Andover; but having received the appointment of Greek tutor at Harvard in 1805, he laid aside his intention of entering the ministry. In 1807 he was chosen Hollis professor of mathematics and natural philosophy in the same college. The standard of mathematical education was then low in American colleges, and he set himself the task of raising it to the European level. In 1818 he published for the use of his pupils a translation of Lacroix's "Elements of Algebra," speedily followed by selections from Legendre, Biot, Bézout, and others. These works were at once adopted as text books by the college, and by the United States military academy. He also contributed to the scientific periodicals and to the "North American Review." For 13 years, from 1811 to 1824, he was recording secretary of the American academy, its vice-president in 1829–'30, and member of the committee of publication from 1810 to 1825. His principal papers in the "Memoirs" of the academy are: "Observations on the Great Comet of 1811;" "Abstract of Meteorological Observations made at Cambridge from 1790 to 1813;" "Abstract of Meteorological Observations made at Andover;" "Account of the violent and destructive Storm of September 23, 1815;" "Account of a singular Electrical Phenomenon, observed during a Snow Storm accompanied with Thunder." In 1833 Bowdoin college conferred on him the degree of LL.D., and in 1836 he resigned his chair in consequence of a painful illness, which eventually caused his death.

FARREN, ELIZA, countess of Derby, an English actress, born in Liverpool in 1759, died April 23, 1829. Her father, a native of Cork, who was successively a surgeon, an apothecary, and an actor, at his death left his family in great indigence, and Eliza was forced to appear on the stage. She made her début in Liverpool in 1773, and in London in 1777, where she played successively at the Haymarket, Covent Garden and Drury Lane. Although a very graceful and lively actress, she owed her reputation chiefly to her remarkable beauty, which received the homage of the most illustrious men of the time, such as Fox and the duke of Richmond. She was esteemed as much for her virtues as her beauty, and became, May 1, 1797, the wife of the 12th earl of Derby, then a widower, the grandfather of the present British premier.

FARS, or FARSISTAN (anc. *Persis*), a S. W. province of Persia, bounded N. by Irak-Ajemi and Khorassan, E. by Kerman, S. by Laristan and the Persian gulf, W. by the Persian gulf and Khuzistan, lying between lat. 27° 40′ and 31° 52′ N., and long. 49° 30′ and 55° 20′ E.; greatest length about 300 m., breadth 250; area, 55,000 sq. m.; pop. estimated at 1,700,000, including various tribes, Turkomans, Banjans, Persians, and a small number of Jews. It is divided into the Germaseer and Seerhud, or warm and cold regions. The former extends inland from the coast, its surface being a sandy plain, wholly dependent for vegetation on the periodical rains. The latter comprises the more elevated region belonging to the great range of mountains which extend from the Caucasus to the gulf, and forms the watershed between the rivers that flow to the sea and to the salt lake of Bakhtegan. This portion of the province consists of fertile valleys, generally 8 to 10 m. in width by 15 to 100 in length. A few of these valleys, as Shiraz, Kazeroon, and Merdesht, are cultivated, but many are wooded and uninhabited. Eastward the country is more open, sandy, and ill supplied with water. The chief rivers are the Firuzabad, Tabris, Nabon, and Tab (anc. *Arosis*), flowing into the Persian gulf, and the Bundemeer (anc. *Araxes*), falling into Lake Bakhtegan. Another salt lake near Shiraz supplies the province with salt. The general products of the country are tobacco in large quantity, wine, rice, dates, opium, linen, cotton, silk, cochineal, and roses for the manufacture of attar. Iron and lead mines exist, as also quarries of marble and alabaster. Borax and naphtha are among the chemical products. Cattle and sheep husbandry is neglected, but attention is given to the raising of horses, camels, and asses, for use and export. The commerce is chiefly with India. The government of the province is vested in a prince of the sovereign's family, with governors of districts. Several interesting ruins exist. Thirty miles N. of Shiraz are the remains of Persepolis, one of the most celebrated and magnificent cities of antiquity. The district of Fessa is supposed by some antiquaries to represent the ancient Pasargada, and to contain the tomb of Cyrus. In the valley of Kazeroon are the remains of Shahpoor, a city older than the days of Alexander, and refounded by Sapor. The famous sculptured rocks, called by the Persians Nakhsh-i-Rustam, are in the plain of Darabgerd. Lady Sheil, in her "Glimpses of Life and Manners in Persia" (London, 1856), enumerates about 20 different tribes in the province of Fars, the most numerous and troublesome of

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whom are the Kashghai or Kashkai and the Mamasenee. The English consul, Mr. Keith Edwin Abbott, who visited Fars subsequently to Lady Sheil (in 1850), derived some new information from the Eel Begghi himself, under the hereditary authority of whose family the tribes of Fars have been for some generations past. He estimates the total number of families of the various tribes at from 20,000 to 22,000, exclusive of the Mamsenni, who number about 2,000 families. Inoculation is said to have been known among the tribes of Fars for centuries. The cow-pox, however, is unknown among them. Among the principal towns are Shiraz, the capital; Jehroom, the principal market for tobacco, and a good market for English cotton goods; Kazeroon, occupying more space but less populous than Jehroom, with excellent opium produced in the vicinity; Darab or Darabgerd, possessing 50 years ago about 100,000 date trees, which, owing to the neglect of cultivation, are now reduced to 30,000; Behbehan or Babahan; and Bushire, the chief port in the Persian gulf, which, during the late war between Great Britain and Persia, surrendered to the English under Gen. Outram in Dec. 1856.

FARTHINGALE (Fr. *vertugadin*, It. *guardinfante*), a petticoat spread to a wide circumference by hoops of willow, whalebone, or iron, introduced into England under this name in the reign of Elizabeth. Gentlemen at that time wore trunk hose or breeches, and ladies wore farthingales, which in the reign of Anne were also termed tub petticoats. They appeared in France early in the reign of Louis XV. under the name of *vertugadins* and *paniers*, or basket petticoats, the law of their structure being that their greatest diameter should equal the height of the lady. Their abandonment was effected near the close of the same reign by Mlle. Clairon, who ventured to appear upon the stage without them, but they again became fashionable under Marie Antoinette. The crinoline petticoats now in fashion throughout Christendom resemble farthingales.

FASCES (Lat.), in Roman antiquity, a bundle of rods in the middle of which was an axe, carried by lictors before the superior magistrates as a symbol of authority.

FAST (Sax. *fæstan*, to keep), abstinence from food, especially as a religious observance, applied also to the period of such abstinence. Religious fasting was common among the oldest nations of the Orient, being from the earliest times one of the mortifications of the fakirs of India, and in practice among the ancient Egyptians by those who devoted themselves to the worship of Isis. The Greeks and Romans had periodical fasts, some of which were ordained specially for priests or women. From the time of Moses the Jews made the day of expiation a day of fasting, and their public fasts afterward became numerous. The modern Jews have 6 fast days annually, of which the day of expiation (*Yom kippur*) is the most strictly observed. All other days are commemorative of national calamities. Fasting was early observed as an act of devotion by Christians, and the Lenten fast is esteemed by the Greek, Roman Catholic, and some Protestant churches, a tradition from the age of the apostles. The Greek church enjoins fasting on Wednesday and Friday of each week and on numerous commemorative occasions, and its 4 great fasts are the 40 days preceding Christmas, the 40 days of Lent, from Monday after Whitsuntide to Peter and Paul's day (June 29), and from Aug. 1 to Aug. 15. The Roman Catholic church makes a distinction between fasting and abstinence, flesh but not fish being prohibited for food on fast days. These are the 40 days of Lent, the 4 Ember days, the Wednesdays and Fridays of the 4 weeks in Advent, and the vigils or eves of the great ecclesiastical festivals. The church of England observes the Lenten and Ember days, and also the 3 Rogation days before Holy Thursday, every Friday except Christmas day, and the vigils of certain festivals. The month of Ramadan is observed as a period of fasting by Mohammedans. In some of the New England States it has been usual for the governor to appoint by proclamation a day in the spring to be observed by fasting, humiliation, and prayer, when religious services have generally been conducted in the churches.

FASTI, in Roman antiquity, registers of the days, months, and other divisions of the year, corresponding with our modern calendars. The term is variously derived from *fas*, divine law, and *fari*, to speak, as it properly designated those days of the year on which legal business could without impiety be transacted, or legal judgment be given by the magistrates. The *fasti calendares* or *sacri*, the chief division of these registers, contained the enumeration of all the days, divided into months and weeks of 8 days, according to the *nundinæ* (the days of each of the latter being designated by the first 8 letters of the alphabet), the calends, nones, and ides. Days on which legal business could be transacted were marked by F, as *fasti;* those from which judicial transactions were excluded by N, as *nefasti;* and days on which the assemblies of the comitia were held by C. Primarily these registers are said to have been intrusted by Numa as sacred books to the care of the *pontifex maximus*, and for nearly 4 centuries the knowledge of the calendar continued to be in exclusive possession of the priests, one of whom regularly announced the new moon, and the period intervening between the calends and the nones. On the nones the *rex sacrorum* proclaimed the various festivals to be observed in the course of the month, and the days on which they would fall. This knowledge, which must have greatly extended the influence of the priests, who seemed to regulate the year and its affairs as if according to revealed divine wisdom, was first made public (304 B. C.) by Cneius Flavius, a scribe to Appius Claudius the Blind, who, having acquired sufficient information from the pontifical books, exhibited a table of the fasti in the forum, for

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which he was rewarded by the gratitude of the people with the dignity of curule ædile. From this time forward such tables of stone or marble became common. Beside the above mentioned divisions of time, with their notation, they generally contained the enumeration of festivals and games, which were fixed on certain days, astronomical observations on the rising and setting of the stars and on the seasons, and sometimes brief notices about religious rites, as well as of remarkable events. In later times flattery inserted the exploits and honors of the rulers of Rome and their families. The rural fasti (*rustici*, distinguished from the *urbani*) also contained several directions for rustic labors to be performed each month. Ovid's celebrated *Libri Fastorum* may be considered as what we would call a companion to the almanac, being a poetical illustration of the Roman year as remodelled in his time by Julius Cæsar. A different kind of *fasti* were those called *annales* or *historici*, also *magistrales* or *consulares*, a sort of chronicles, containing the names of the chief magistrates for each year, and short accounts of remarkable events noted opposite to the days on which they occurred. Hence the meaning of historical records in general attached to the term *fasti* in poets, while it is used in prose writers of the registers of consuls, dictators, censors, and other magistrates belonging to the public archives. Several specimens of fasti of different kinds have been discovered in the last 3 centuries, none of which, however, is older than the age of Augustus. The *fasti Maffeani*, the complete marble original of which was long preserved in the Maffei palace at Rome, but finally disappeared, are now known by a copy of Pighius; the *Verriani*, known as the Prænestine calendar, comprising only 5 months, are historically no less remarkable. The latter appear to have contained ample information about festivals, and details of the honors bestowed upon, and the triumphs achieved by Cæsar, Octavianus, and Tiberius. A most remarkable specimen of the second class was discovered in 1546 in the *forum Romanum*, in large fragments, and is known under the name of *fasti Capitolini*. New fragments of the same tablets were found in 1817 and in 1818. Originally they contained the records of Rome from the expulsion of the kings to the death of Augustus. Several modern writers, as Sigonius, Reland, and Baiter, have published chronological tables of Roman magistrates under the title of *fasti*.

FAT OF ANIMALS. See Adipose, Aliment, and Candle.

FATA MORGANA, or castles of the fairy Morgana, a form of mirage occasionally seen by observers standing on eminences on the Calabrian shore, and looking westward upon the strait of Messina. It occurs in still mornings, when the waters are unruffled by breeze or current, and the sun, rising behind the mountains of Calabria, strikes down upon the smooth surface at an angle of 45°. The heat then acts rapidly upon the stagnant air, the strata of which but slowly intermingling present a series of mirrors which variously reflect the objects upon the surface. The tides must have operated to raise up the surface into a convex form, as sometimes occurs at this locality. Objects upon the Sicilian shore opposite, beneath the dark background of the mountains of Messina, are seen refracted and reflected upon the water in mid channel, presenting enlarged and duplicated images. Gigantic figures of men and horses move over the picture, as similar images in miniature are seen flitting across the white sheet of the camera obscura. It sometimes happens that the sky above the water is so impregnated with vapor that it surrounds these objects with a colored hue. The wonderful exhibition is but of short duration. Its appearance is hailed with shouts by the populace, who call attention to it by the cry of "Morgana, Morgana!" The phenomenon is not peculiar to this locality, though the configuration of the coast and the meteorological conditions of the region concur to render its exhibition more frequent and also more beautiful here than elsewhere. The description of Minasi, which was published at Rome in 1773, is commonly quoted as the best account of this mirage. (See "Nicholson's Journal," 4to., vol. i., p. 225, &c.)

FATES. See Parcæ.

FATIMITES, or Fatimides, the descendants of Fatima, the daughter of Mohammed, a powerful Arab dynasty which ruled for 2½ centuries in Egypt and Syria, while the Abbasside caliphs reigned at Bagdad. They claimed as their founder Ismael, the 6th of the 12 imams who were descended from Ali and Fatima, but this claim was disputed, and they were variously said to have first appeared in Persia, in Egypt, and at Fez, and to have been descendants of a Jew, a locksmith, and an eastern sage. They first attained to empire under Abu Mohammed Obeidallah, who in the year of the hegira 296 (A. D. 909) announced himself in Syria as the *mahady*, or director of the faithful, foretold by the Koran, and expected as the Messiah by a class of heterodox Mussulmans. Denounced by the caliph, he fled to Egypt, and traversed the whole of the north of Africa to Sedjelmessa, where he was imprisoned. He was delivered and recognized as a messenger from heaven by Abu Abdallah, who had just overthrown the African dynasties of the Aglabites and Medrarites. He made himself master of northern Africa from the straits of Gibraltar to the border of Egypt, and his successor conquered the island of Sicily. Moez, the 4th caliph, wrested Egypt from the Abbassides in 970, founded Cairo, fixing his residence in its present suburb of Fostat, and conquered Palestine and a large part of Syria. Aziz, his successor (975–996), consolidated and extended his conquests, embellished Cairo with many monuments, and married a Christian woman, whose brothers he made patriarchs of Alexandria and Jerusalem. His son Hakem (996–1021) was preëminently distinguished for

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fanaticism and cruelty, persecuting alike Christians, Jews, and orthodox Mohammedans, and giving the first impulse to the crusades by his tyrannical course at Jerusalem. Declaring himself a manifestation of God, he became near the close of his reign the founder of a new religion, now represented by the Druses of Syria, who expect his reappearance as their Messiah. From his time the power of the Fatimites declined. On the death of Adhed, the 14th caliph, in 1171, the dynasty was extinguished, and a new one established by the great Saladin, who had accompanied an army sent thither by the sultan Noureddin some years before, to settle a dispute between rival claimants to the viziership.

FATIO DE DUILLERS, Nicolas, a Swiss geometer and religious enthusiast, born in Basel, Feb. 16, 1664, died in Worcestershire, England, in 1753. He was educated at Geneva, and at the age of 18 wrote a letter to Cassini, in which he proposed a new explanation of the rings of Saturn; in 1685 he gave new developments to the theory of zodiacal light propounded by Cassini; and settling in England, he bitterly attacked Leibnitz, whom he accused of having stolen from Newton the discovery of the differential calculus. In the latter part of his life he became one of the most ardent defenders of the prophets of the Cévennes, and claimed for himself inspiration and the power to raise the dead. Shaftesbury ridiculed him in his letter on enthusiasm; and Fatio, with two associates, was exposed in the pillory in London, in Sept. 1707, "for abetting and favoring Elias Marion in his wicked and counterfeit prophecies." He subsequently went to Asia, intending to convert the world, but returned to England and lived in retirement till his death.

FAUCHER, Léon, a French political economist, born in Limoges, Sept. 8, 1803, died in Marseilles, Dec. 14, 1854. While a youth he supported his mother and defrayed the expenses of his education by employing his nights in designing embroidered work. Subsequently he proceeded to Paris to gain a livelihood by teaching, and at the same time to pursue the studies of moral and political science. After the revolution of 1830 he was successively editor of the *Temps*, the *Constitutionnel*, and the *Courrier Français*. He was chosen a member of the chamber of deputies for Rheims in 1846, and attaching himself to the opposition party, took a prominent part in debates on all questions touching upon political economy. He was elected by the department of Marne as one of its representatives in the national assembly of 1848 became minister of the interior, Dec. 29, and held the office till May 14, 1849. He was again appointed minister of the interior, April 10, 1851, and was succeeded by M. de Thorigny, Oct. 26, 1851. He was instrumental in preparing the law of May 31, 1850, restricting the limits of suffrage; but he declined to accept office under Louis Napoleon after the *coup d'état*. After withdrawing from politics, he devoted himself to the interests of the *Crédit foncier*, in the organization of which he took a prominent part. Admitted to the academy of moral and political science in 1849, he gave to that body a fund of 20,000 francs, for the purpose of awarding every 3 years a prize of 3,000 francs to the author of the best memoir on political economy, or the best biography of French or foreign political economists, the subject to be suggested by the academy. On the free trade question he occupied a middle position, advocating a gradual reduction of duties, but deprecating all violent sweeping reform. He proposed the formation of a commercial league between France, Belgium, Spain, and Switzerland, under the name of "southern league," as a counterpoise to the German *Zollverein*, and published his views on the subject in a pamphlet in 1842. Among his remarkable earlier efforts was an essay in the *Revue des deux mondes* on the relations of property in France, and a pamphlet in 1838 on prison reform. His principal work, *Études sur l'Angleterre*, a description of the social, industrial, and political institutions of England, appeared in 1845. His remarks on the production of the precious metals, and the withdrawal of gold from circulation in several countries in Europe, were translated into English in 1852, by Mr. Thomas Hankey, jr., for some time governor of the bank of England.

FAUCIGNY, a N. E. province of the duchy of Savoy, belonging to the administrative division of Annecy; area, about 850 sq. m.; pop. in 1857, 103,986. Capital, Bonneville. Faucigny is one of the most elevated districts in Europe, being partly covered by the Pennine Alps. The valleys of Chamouni and of the Giffre belong to it. The most beautiful Alpine flowers abound on the mountains; the valleys are fertile and well cultivated. The chief occupation of the inhabitants consists in the rearing of cattle.

FAULT, in geology, a displacement of strata, interrupting their continuity. Faults are frequently met with in working coal beds in the English mines, the miner coming unexpectedly in his progress against an abrupt wall of other strata. The angle this makes with the plane of the bed he is working indicates whether he must look up or down for its continuation on the other side of the dislocation, always looking for this on the side of the obtuse angle. Beds are thus heaved from a few feet to several hundred or even thousand feet. Faults of great extent are rarely met with in the United States, though some have been noticed in Pennsylvania and Virginia. (See Anthracite, vol. i. p. 647.)

FAUNA, the assemblage of animals naturally belonging to a continent, region, or district limited by geographical or physical boundaries, whether of land or water; also, in geology, the remains of animals found in any particular formation. Among the animals constituting the fauna of a country we find certain types occurring nowhere else, as the sloths in South America, the ornithorhynchus in Australia, the hippopotamus in Africa, the tiger in Asia, the walrus and polar bear in the arctic re-

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gions; others have a more extended range, as the marsupials of Australia, represented in America by the opossum; others occur in almost all parts of the world, as the bats, which show different species in America, Europe, and Asia. The ultimate distribution of the species of a fauna is intimately connected with the temperature, nature of the soil, and character of the vegetation; this is most strikingly proved by the arctic fauna, which includes animals common to America, Europe, and Asia, continents whose species in the temperate and tropical zones are entirely different. The flora of a country, which is the natural combination of plants, like the fauna, has peculiar characters more resembling others as we go toward the pole, and widely different in the regions of the equator. In the geological faunæ we find evidence of the same laws of distribution in localities best suited to special forms of life, in many cases coinciding with the present animals; the edentata of Brazil and the marsupials of Australia of former epochs belong to the same types, though of different genera and species, as the existing animals. The distribution of faunæ is interesting not only in their relation to palæontology and zoology, but to some of the highest and most disputed points of ethnology. Agassiz and others have shown that the natural provinces of animals coincide remarkably with the natural range of distinct types of man. The 4 great primary divisions of animals, viz., vertebrata, articulata, mollusca, radiata, are found together in every part of the present ocean as well as of the ancient waters; on land we find the first 3 divisions only, the last being entirely aquatic. The distribution of the classes is more limited; though the radiata are with one exception (*hydra*) marine, some mollusks are marine, others fluviatile, others terrestrial; the same is true of articulates and vertebrates. Every natural province has its peculiar animals and plants, though the limits of such provinces are as yet not sufficiently well ascertained to be of much advantage in classification. The unequal distribution of these faunæ is well displayed in a sketch by Agassiz in Nott and Gliddon's "Types of Mankind," which may be regarded as an approximation to a natural arrangement of zoological provinces, whether his conclusions in regard to their relation to human types be accepted or not. Prof. Agassiz divides the globe into 8 realms, as follows: 1. Arctic realm, corresponding to the arctic circle, or rather to the isothermal line of 32° F., within which the forests disappear; inhabited by Esquimaux and other hyperborean nations, and by a fauna common to the 3 northern continents; its characteristic animals are the white bear, walrus, reindeer, seals, large cetaceans, palmiped birds, numerous fishes (especially the *salmonidæ*), and a variety of worms, crustacea, mollusks, echinoderms, and medusæ; no reptiles form part of this fauna; the vegetation is of the most meagre description, consisting of mosses, lichens, and a few gramineous and flowering plants and dwarf birches. 2. The Asiatic, inhabited by Mongolians, comprises the Mantchoorian, Japanese, Chinese, central Mongolian, and Caspian faunæ, whose limits are sufficiently explained by their names; among its animals are the musk deer, the yak, the Bactrian camel, the wild horse and ass, and peculiar species of bear, antelope, and goat. 3. The European realm, inhabited by the most cultivated races, comprises the Scandinavian, Russian, central European, southern European, north African, Egyptian, Syrian, and Iranian faunæ; the unity of this realm is shown by the range of its mammals and birds, and by its physical geography; its animals represent chiefly the same genera as those of Asia, but of different species, embracing the best known and many of the originals of the domesticated species; the nations of men bear a very striking relation to these circumscribed faunæ. 4. The American realm, inhabited by the American Indians, comprises the Canadian, middle states, southern states, Rocky mountains, northwest, Californian, Central American, West Indian, Brazilian, pampas, Cordilleras, Peruvian, and Patagonian faunæ; among the characteristic animals are the sloths and armadillos, opossum, bison, distinct species of monkeys, deer, bears, goats, and sheep, the humming and mocking birds, 3-toed ostrich, the alligator, gar-pike, &c. (Realms 2, 3, and 4, lie within the temperate zone, included between the isothermes of 32° and 74° F.) 5. The African realm, inhabited by negro races, comprises the Saharan, Nubian, Abyssinian, Senegalian, Guinea, tableland, cape of Good Hope, and Madagascar faunæ; among the animals are the chimpanzee, hippopotamus, lion, zebra, gnu, giraffe, African elephant and rhinoceros, 2-toed ostrich. 6. The Malayan realm, including the Dukhun, Indo-Chinese, and the island faunæ, corresponding to the Malay and Telingan races of man; among its animals are the orang-outang, Indian elephant, rhinoceros, and tapir, and the arnee ox. 7. The Australian realm, characterized principally by the marsupials and monotremes, and by the absence of monkeys, ruminants, carnivora, pachyderms, and edentates. 8. The Polynesian realm, inhabited by the South sea islanders, with numerous local faunæ, each group of islands having many animals peculiar to itself.—The human race is distributed all over the earth; the scomberoid fishes have an equally wide distribution in the sea. Fishes, though inhabiting a medium which allows the freest migration, are circumscribed within local limits; those of the two sides of the Atlantic, except a few northern ones, are specifically distinct, and their distribution is principally influenced by the line of temperature established by the average of the greatest cold during the 30 coldest days of the year. That the terrestrial and marine faunæ do not necessarily correspond in the same latitude, and on the same continent, is proved by the facts in regard to the southern portion of the United States. The peninsula of Florida is inhabited by terrestrial and fluviatile animals,

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and is covered with land plants, the same as those of the adjoining states of Georgia, Alabama, Mississippi, &c., which are with few exceptions those of a temperate or at most subtropical zone; while the marine fishes and invertebrates, and the algæ, are essentially tropical. Some of the most remarkable examples of limited distribution of animals in local faunæ, are the orangs of the Sunda islands, the gorilla of the west coast of Africa near the Gaboon river, the rhinoceros and elephant of southern Africa and Asia, the tapir of South America and of the East Indies, the camel and dromedary, the ostrich of Africa and of South America, the cassowary and apteryx of Australia, the proteus of Carinthia, and the blind fish and crawfish of the Mammoth cave, Kentucky.

FAUNS, in Roman mythology, rural divinities, descended from Faunus, king of Latium, who introduced into that country the worship of the gods and the labors of agriculture. The poets ascribed to them horns, and the figure of a goat below their waist, but made them gayer and less hideous than the satyrs. Fauns, like satyrs, were introduced upon the ancient stage in comic scenes. The cabalistic mythology also admits the existence of fauns, whom it regards as imperfect creatures. It supposes that God had created their souls, but, surprised by the Sabbath, had not time to finish their bodies. Hence these unfinished beings seek to shun the Sabbath, on which day they retire to the deepest solitudes of the woods and forests.

FAUQUIER, a N. E. co. of Va., bounded N. W. by the Blue Ridge, and S. W. by Rappahannock river and one of its branches; area, 680 sq. m.; pop. in 1850, 20,868, of whom 10,350 were slaves. It has a diversified surface, a productive soil, and is rich in minerals. There are several gold mines which have been worked with profit, and beds of magnesia and soapstone have also been discovered. The staple productions are grain, wool, and hay. In 1850 the county yielded 562,959 bushels of Indian corn, 386,324 of wheat, 8,523 tons of hay, 210,711 lbs. of butter, and 72,825 of wool. There were 35 churches, and 923 pupils attending public and other schools. Value of real estate in 1856, $9,755,536. Formed in 1759, and named in honor of Gov. Francis Fauquier of Virginia. Capital, Warrenton.

FAURIEL, Claude, a French historian and writer upon belles lettres, born in St. Étienne, Oct. 21, 1772, died in Paris, July 15, 1844. In 1793 he became an officer in the army of the Pyrénées, but after a year's service renounced the military profession, and devoted himself to study. He was for 2 years secretary to Fouché, the minister of police, but resigned when in 1802 he saw Napoleon about to concentrate the government in his own hands. Meanwhile he had made acquaintance with many literary persons, had attracted the attention of Madame de Staël, had become associated with Condorcet and De Gerando, and was devoting particular attention to the oriental languages. He published in 1810 a translation of the *Parthenais* of Baggesen, and soon afterward translations of 2 of the tragedies of Manzoni. The latter showed his esteem for Fauriel by dedicating to him his *Carmagnola*. He began a history of stoicism, for which he had collected many materials, but he wearied of the labor of writing, and the work was never finished. In 1824–'5 he published his "Popular Songs of Modern Greece," giving both the original text and a French version. In 1830 he was appointed to the professorship of foreign literature in the faculty of letters at Paris, created expressly for him by Guizot. In 1836 appeared his "History of Southern Gaul under the German Conquerors," in 4 vols. This work gained for him admission into the academy of inscriptions and belles lettres. He was one of the collaborators in the "Literary History of France," for which he furnished a remarkable notice of Brunetto Latini, beside many others. In 1837 he published a "History of the Crusade against the Albigensian Heretics, written in Provençal Verses by a contemporary Poet," to which he added a translation and introduction. After his death one course of his lectures was published under the title of a "History of the Provençal Literature," in which he developed his theory that this literature gave origin to the romances of Charlemagne and of the round table, and to the ideas of honor, love, and gallantry which modified the manners of the middle ages. An English translation of the first 22 chapters, which comprise the complete history of Provençal lyrical poetry, by Prof. G. J. Adler, has been announced for publication (New York, 1859.) Another course of his lectures was published, entitled "Dante and the Origin of the Italian Language and Literature."

FAUST, Dr. Johann, a prominent character of the national and popular poetry of Germany. According to tradition, he was a celebrated necromancer, born about A. D. 1480 at Knittlingen, or Kundlingen, in Würtemberg, or, as others have it, at Roda in the present grand duchy of Saxe-Weimar, or at Saltwedel in the then principality of Anhalt. He is said to have studied magic at Cracow. Having mastered all the secret sciences, he was seized with gloomy dissatisfaction at the shallowness of human knowledge, and with an intense longing after a more elevated kind of mental and physical enjoyment. He conjured the Evil One, and made an agreement with him, according to which the devil was to serve Faust for full 24 years, obeying all his behests, and at the expiration of the term Faust's soul was to be delivered to eternal damnation. The contract, signed by Faust with his own blood, contained the following 5 conditions: "1, he shall renounce God and all celestial hosts; 2, he shall be an enemy of all mankind; 3, he shall not obey priests; 4, he shall not go to church nor partake of the holy sacraments; 5, he shall hate and shun wedlock." Faust having signed this agreement, Satan sent him a *spiritus familiaris* (Mephistopheles, Mephostophilis, or Mephistophiles), a

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devil "who likes to live among men." Faust now began a brilliant worldly career. He revelled in all manner of sensual enjoyment, of which his attentive devil-servant, with an inexhaustible fertility of imagination, was always inventing new and more attractive forms. When remorse tormented Faust and surfeit led him to sober reflection, Mephistopheles diverted him with all kinds of curious devilries. Faust frequently joined in them, and applied his supernatural powers to the most astonishing feats of witchcraft. This period of his career is embellished by popular poetry with numerous comical tricks and miraculous feats. Disgusted at last with his life of dissipation, Faust yearned for the blessings of matrimony. Satan, afraid of losing him, appeared in all the terrors of fire and brimstone, and frightened him out of this purpose. But in order to satisfy his desire, he sent him from the lower regions the beautiful Greek Helena as a concubine. Faust lived with her, and she bore him a son, Justus Faustus. Finally, the term of 24 years drawing to its close, remorse and fear overpower him completely; as a last resort he seeks relief and salvation from priests, but nothing avails him. All flee from the doomed man. Midnight approaches; an unearthly noise is heard from Faust's room, the howling of a storm which shakes the house to its very foundation, demoniacal laughter, cries of pain and anguish, a piercing, heart-rending call for help, followed by the stillness of death. Next morning they find Faust's room empty, but on the floor and walls evidence of a violent struggle, pools of blood and shattered brains; the corpse itself, mangled in a most horrible manner, they find upon a dunghill. The beautiful Helena and her son have disappeared for ever.—That some such person as Faustus has existed is asserted in the most direct manner by writers who profess to have conversed with him. Among these eye-witnesses are Philip Melanchthon, the great reformer, and Conrad Gesner (1561), and even in Luther's "Table-Talk" mention is made of Dr. Faustus as a man irretrievably lost. But it is by no means certain that the real name of this man was Faustus. Joseph Görres maintains that a certain George Sabellicus is the only historical person in whom the original of Faust can be recognized. In his opinion Faustus was a fictitious name which Sabellicus assumed. Others have endeavored to show that George Sabellicus disappeared about the year 1516 or 1517, and that Faust was one of his pupils. Faust's death is presumed to have taken place in 1538. Tradition has connected with his name a great number of biographical traits and magical feats formerly ascribed to other reputed conjurers, such as Albertus Magnus, Simon Magus, and Paracelsus. "Faust," says Görres, "is rather a book than a person. All that is related of his wonderful magical powers has formed part of popular tradition for centuries before his time. Faust was, so to speak, merely the seal stamped upon the collection of all these traditions." This opinion is essentially adopted by the brothers Grimm. Karl Rosenkranz says: "The popular history of Dr. Faust is merely a combination of a number of fables, all turning upon the same point, viz.: the attempt of man to rise to superhuman mental and physical power by a compact with Satan. Many things ascribed to Faust by popular belief are likewise related of other men whose profound knowledge or skill the mass were unable to comprehend. In this respect the fable of Faust may be compared to those of Fortunatus or the Wandering Jew." In its very earliest and crudest form the fable of Faustus appears as an illustration, however quaint and coarse, of a deep philosophical sentiment. The tragical fate of Faustus is represented to result from an irreconcilable conflict of faith and knowledge. In the second part of his *Faust*, Goethe has attempted a poetical solution of the legend. Through all vicissitudes he leads Faust to a point where at last he experiences the feeling of perfect happiness in devoting his intellectual faculties to the promotion of the welfare of his kind. Then he has attained the end which he has pointed out to Mephistopheles as the object of all his longings, and is removed from this life, not, however, to be lost, but to be saved by love, the "ever-womanly" that "leads us on high." Goethe's famous poem attempts to show that man's longing after knowledge may lead him into many errors and failings, but cannot destroy his better nature.—The first printed biography of Faust appeared in 1587, at Frankfort: *Historien von Dr. Johann Fausten, den weitbeschreyten Zauberer und schwarz Künstler.* In 1588 there appeared a rhymed edition and a translation into low Dutch; in 1589, a translation into French, *Histoire prodigieuse et lamentable de Jean Faust;* about the same time, an English version, "A Ballad of the Life and Death of Doctor Faustus, the great Conjurer;" and shortly after, "The History of the Damnable Life and Deserved Death of Dr. John Faustus." The latter version seems to have been the basis of Christopher Marlowe's drama, "Life and Death of Dr. Faustus," which in its turn was transformed into a German puppet play. It is from this puppet play, which has preserved its popularity in Germany for two centuries, that Goethe drew the first conception of his tragedy, a fact which explains the striking similarity between the opening monologue of Faust in Marlowe's and Goethe's poems. In 1599, G. R. Widmann published (in German) a "True History of the Horrid and Execrable Sins and Vices, also of many Miraculous and passing strange Adventures, of Dr. Johannes Faustus" (3 vols.). A new version appeared in 1674, bearing the title (in German), "The Scandalous Life and Horrible Death of the Notorious Arch-Necromancer Dr. Johann Faust." It was often republished, but replaced at last by an abridged edition of Widmann's version (1728). A great number of books on necromancy also pretend to give, from original manuscripts of Faust,

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his cabalistic formulas, charms, talismans, &c. All of these publications, and also all important monographs bearing upon this subject, have been reprinted in the valuable collection of J. Scheible, *Das Kloster weltlich und geistlich* (Stuttgart, 1847). More than 250 different works on the legend of Faust are enumerated in Peter's *Literatur der Faustsage* (2 vols., Halle, 1849, 2d edition 1851).

FAUST, or FUST, JOHANN, an associate of Gutenberg and Schöffer in the first development of the art of printing, born in Mentz, died in Paris about 1466. He probably had no share in the invention of the art, and his connection with it commenced in 1450, when Gutenberg, having expended a fortune in experimenting, induced Faust to enter into partnership with him, and advance funds to establish the business of printing at Mentz, the latter having a lien on the materials as security. The only known productions of the press of Faust and Gutenberg are an indulgence granted by Pope Nicholas V. to Paulinus Chappe, ambassador of the king of Cyprus, of which 13 copies on vellum printed in 1454 remain, and 2 copies of a 2d edition printed in 1455, and an "Appeal to Christendom against the Turks," supposed to belong to the former year. The celebrated folio Latin Bible of the Mazarin library is also attributed to this period. This is a close imitation of the best writing, the rubricated capitals being written in by hand; and it is probably to this edition that is to be referred the well known though apocryphal story of Faust having been arrested at Paris on a charge of magic for selling, at a fraction of their usual price, copies of the Bible so exactly alike that they could not have been produced by human agency alone. A copy of this edition, the only one in America, is in the library of Mr. James Lenox, of New York; it cost about $3,000. In 1455 Faust put an end to the partnership by suing Gutenberg for his advances, amounting apparently to only 1,600 florins, but swelled by charges of interest and expenses to 2,020. The suit resulted in his favor, and he took possession of the greater part of the stock in satisfaction of the debt. Faust then associated with himself Peter Schöffer, his son-in-law, who had been in their employment, and had perfected the process of making movable metallic types by the invention of the punch. The first complete result of this new invention was the *Rationale Divinorum Officiorum* of Durandus (large folio, 1459). Two editions of a Psalter, beautifully executed, had previously appeared with the imprint of Faust and Schöffer (1457 and 1459), but in these the large capitals were cut on wood. Copies of 9 other works from their press with date and imprint still exist, including a Latin Vulgate Bible (2 vols. large fol., 1462), and the *De Officiis* and *Paradoxa* of Cicero (small fol., 1466; a copy of this, the first printed classic author, is in the Astor library, New York), beside several not so authenticated, which from a close resemblance are attributed to them. The quarrels between the archbishop Diether von Isenburg and Adolf of Nassau, which resulted in the sacking of Mentz by the latter in 1462, proved disastrous to Faust's establishment; his workmen were scattered, and the printing process, which had been kept as a secret in Mentz, was divulged by them in other countries. A short time afterward, however, Faust was enabled to resume his operations. He made several journeys to Paris, in the last of which he is supposed to have died there of the plague.

FAUSTIN I. See SOULOUQUE.

FAUSTINA, ANNIA GALERIA, daughter of Annius Verus, prefect of Rome, and wife of the emperor Antoninus Pius, born A. D. 104, died in 141. She ascended the throne with Antoninus in 138, and though the emperor grieved at the profligacy of her life, his affection for her made him place her after death among the number of the goddesses, raise temples and altars to her, and have medals struck in her honor, exceeding in number and variety those in honor of any other Roman empress.—ANNIA, younger daughter of the preceding, wife of her cousin the emperor Marcus Aurelius, born A. D. 125, died in 175. She was the Messalina of her time, surpassing even the dissolute manners of her mother. The emperor was aware of her disorderly life, but loved her, notwithstanding the railleries and murmurs of the people and the advice of his friends. She accompanied him in an expedition to the East, and suddenly died at a village near the foot of Mt. Taurus. Aurelius mourned for her, ranked her among the goddesses, caused medals to be struck in her honor bearing the inscription of *Pudicitia*, and exalted the place where she died into a city with the name of Faustinopolis.

FAVERSHAM, or FEVERSHAM, a market town, borough, and parish of Kent, England, and a member of the cinque port of Dover, on a branch of the Swale, 45 m. E. S. E. of London; pop. in 1851, 4,595. It contains a handsome church, built of flint, with a light and graceful spire, several chapels, schools, and assembly rooms, and a theatre. The town has long been famous for the manufacture of gunpowder, and has also some factories of Roman cement. Its chief trade is in oysters. It is accessible to vessels of 150 tons burden.

FAVIGNANA (anc. *Ægusa* or *Æthusa*, an important Roman naval station), an island of the Ægades group in the Mediterranean, 8 m. from the W. coast of Sicily; pop. 4,000. It is about 5 m. long, and from 2 to 3 m. broad. The surface is low, with the exception of a range of hills running through the centre, on the culminating summit of which is the castle of Santa Catarina. There is a fine bay on the E., on which stand the town and fortress of San Leonardo. San Giacomo, the principal place, is on the N. coast. The island has several quarries, and extensive tunny and anchovy fisheries, in the produce of which, and in sheep, goats, poultry, &c., it has a flourishing export trade.

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FAVRAS, Thomas Mahi, marquis of, a French conspirator against the revolution, born in Blois in 1745, hanged in Paris, Feb. 19, 1790. He entered the army in 1755, and after several campaigns was made first lieutenant in the Swiss guards of Monsieur (afterward Louis XVIII.), and in 1787 commanded a legion in Holland during the insurrection against the stadtholder. In 1790 he was apprehended as the ringleader of a plot to introduce an army of 30,000 men, Swiss and Germans, into Paris by night, which was to murder Bailly, Lafayette, and Necker, and to carry off the royal family and the seals of state to Peronne. He was supposed to be a secret agent of the highest personages, and suspicion was directed to Monsieur, who, alarmed by the public agitation, exculpated himself by a speech at the hôtel de ville. Favras was summoned before the Châtelet, and, while the populace showed the greatest fury against him, shouting "Favras to the lamp-post," he was condemned to be hanged; and he met his fate with unshaken fortitude. When told that no revelations would save his own life, he answered: "Then my secret shall die with me." His execution took place at night, by the light of torches, amid the jests of the crowd, and was the first example of the equality of revolutionary justice, capital punishment having formerly been inflicted on nobles by decapitation, and only on plebeians by hanging.

FAVRE, Gabriel Claude Jules, a French lawyer and politician, born in Lyons, March 21, 1809. From 1830, when he advocated the abolition of royalty, until the present day, he has been a consistent champion of republican principles, in the press, in the forum, and at the bar, where he has frequently been the defender of parties indicted by the government. After the revolution of Feb. 1848, he became secretary-general of the ministry of the interior, but resigned on being elected to the constituent assembly. He officiated for some time as under secretary of the ministry of foreign affairs, and was often heard in debate. He voted for the prosecution of Louis Blanc and Caussidière, on account of the insurrection of June, 1848, and for proscriptive measures against political clubs and tumultuous assemblies in the street; but he proposed a preamble to the constitution, making it incumbent upon the state to assist those of the working classes who were unable to find employment, refused to join in the vote of thanks to Cavaignac, and opposed the expedition of Dec. 1848, to Rome. After the election of Louis Napoleon to the presidency (Dec. 20, 1848), he became his strennous opponent, and after the flight of Ledru-Rollin (June 13, 1849), Favre was the acknowledged leader of the *montagne* party. After the *coup d'état* of Dec. 2, 1851, he was elected member of the general council of the departments of the Loire and Rhone, but refused to take the oath to the new constitution. In 1858 he created a profound sensation by his defence of Orsini, whose advocate he was, and by his boldness in proclaiming on this occasion his enthusiastic love of free institutions. In the same year he became a member of the legislative body, and gave a new evidence of his moral courage on the outbreak of the war with Austria (April, 1859), by denouncing in that body the inconsistency of the violent overthrow of liberty at home and the attempt to establish it by force of arms abroad.

FAWKES, Guy, a British conspirator, born in Yorkshire, executed in London, Jan. 30, 1606. A soldier of fortune, he was serving in the Spanish army in the Netherlands, when early in 1604 the scheme of blowing up the parliament house with gunpowder, and thus destroying at a blow the king, lords, and commons, was conceived by Robert Catesby, a Roman Catholic of ancient and opulent family. It was intended thus to take vengeance for the severity of the penal laws against Catholics, a relaxation of which had been vainly expected on the accession of James. Fawkes was perhaps the 4th person admitted into the conspiracy, and returned to England in May, 1604, having been selected as a useful coadjutor by Thomas Winter, who had gone on a fruitless mission to solicit the intervention of the Spanish king in behalf of the English Catholics. Thomas Percy, one of the confederates, rented a house adjoining that in which parliament was to assemble, of which Fawkes, who was unknown in London, took possession as his servant, under the assumed name of Johnson. Parliament was soon after adjourned till Feb. 7, 1605, and on Dec. 11 preceding the conspirators secretly met in the hired house of Percy, and began to excavate a mine. Seven men were thus occupied until Christmas eve, never appearing in the upper part of the house, while Fawkes kept constant watch above. Parliament was again prorogued from Feb. 7 to Oct. 3, and the conspirators therefore dispersed for a time, but completed their arrangements between the following February and May. Their labor was lightened by hiring a vault immediately below the house of lords, which had just been vacated by a dealer in coals, into which they conveyed by night 36 barrels of powder, and covered them with faggots. They again dispersed, Fawkes proceeding to Flanders to confer with persons there with a view to securing foreign coöperation in the military and political movements that were to follow the explosion; and as money was needed to prepare for these, 3 wealthy gentlemen, Sir Everard Digby, Ambrose Rookwood, and Francis Tresham, were made privy to the plot. The meeting of parliament was again deferred to Nov. 5, and Fawkes was appointed to fire the mine with a slow match. The conspiracy was detected from the attempt of some one privy to it to save the life of Lord Monteagle, a Roman Catholic peer. Though it had been decided to convey no express information to the Roman Catholics who would be present, but only to prevent on general grounds as many as possible from attending, yet on Oct. 26 Lord

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Monteagle received an anonymous letter entreating his absence from the parliament, and intimating a terrible danger. The letter was shown to several lords of the council, and afterward to the king, and resulted in a search through the neighboring houses and cellars on the night of Nov. 4, when Fawkes was seized just after issuing from the cellar, in which the powder was at once discovered beneath the faggots. Matches and torchwood were found in his pockets. Brought before the king and council, he boldly avowed his purpose, but not even the rack could extort from him any disclosure concerning his associates till they had announced themselves by appearing in arms. The failure of the plot was, however, complete, and Fawkes was arraigned, condemned, and executed, as were 7 of his confederates, while others were tried separately. The atrocious character of this conspiracy prejudiced the minds of the nation against the Roman Catholics, and led to the enactment of additional penal statutes against them. The anniversary of the plot, Nov. 5, was long celebrated in England and New England by the boys of the towns carrying about an effigy of Guy Fawkes which was finally burned in some public place. It was customary for the boys on these occasions to sing verses beginning:

> Remember, remember, the fifth of November,
> The gunpowder treason and plot.

This custom has entirely ceased in New England, though it is still maintained to some extent in the mother country. It was formerly a legal holiday in England, but has recently been abolished as such.

FAXARDO, Diego Saavedra, a Spanish author and statesman, born in Algezares, in the province of Murcia, in 1584, died in Madrid in 1648. Having been graduated as a doctor of law at the university of Salamanca, he lived 40 years out of Spain, employed on various diplomatic missions for the government. His last mission was at the congress of Münster from 1643 to 1646 as representative of Philip IV. Finally, on being recalled in the latter year to Spain, he was appointed a member of the supreme council of the Indies. The first edition of his most successful work, *Empresas politicas, ó idea de un principe politico Christiano*, &c., intended to instruct the infante of Spain, to whom it was dedicated, in the duties of government, appeared at Münster in 1646. He wrote the 2 first volumes of the "History of the Goths in Spain," which was continued through the reign of Henry II. by Alonso Nuñez de Castro. Faxardo's complete works were published at Antwerp in 1688, and a new edition at Madrid in 1789–'90.

FÁY, András, a Hungarian author, born at Kohany, in the county of Zemplén, in 1786. He studied law, was active as a member of the national opposition against the rule of Metternich, and wrote a series of works in prose and poetry, which procured him a place among the classics of his country. His most noted work is his "Fables" (*Mesén*, Vienna, 1820; German translation by Petz, Vienna, 1821), in the style of those of Lessing. A collection of his works in 8 vols. appeared at Pesth in 1843–'4.

FAY, Theodore Sedgwick, an American author and diplomatist, born in New York, Feb. 10, 1807. He was admitted to the bar in 1828, but almost immediately afterward resigned his profession for a literary life, and became a contributor to the "New York Mirror," and subsequently one of its editors. In 1832 he published "Dreams and Reveries of a Quiet Man," a collection of articles which had from time to time appeared in the "Mirror." In 1833 he married, and soon after sailed for Europe, where he spent 3 years in travelling. Among the fruits of his observations abroad was the "Minute Book," a journal of travels. During his absence appeared also his first novel, "Norman Leslie" (New York, 1835), which had considerable success. In 1837 Mr. Fay received the appointment of U. S. secretary of legation at the court of Berlin, a position which he retained until 1853, when he was promoted to be resident minister at Bern, in Switzerland, where he still remains. In 1840 he published the "Countess Ida," a novel designed to bring into disrepute the practice of duelling, which was followed in 1843 by "Hoboken, a Romance of New York," written with a similar object. In 1851 appeared his "Ulric, or the Voices," a poem in 19 cantos (to which a 20th was added in the "Knickerbocker Gallery" in 1855), describing the struggles of the human soul with demoniac temptations. Among Mr. Fay's remaining works are "Sydney Clifton" (1839) and "Robert Rueful" (1844), two short tales, a series of papers on Shakespeare, and a variety of fugitive pieces in prose and verse. A "History of Switzerland" by him is announced.

FAYAL, one of the Azores, or Western Islands, in lat. 38° 30′ N., long. 28° 40′ W.; area about 27,520 acres, nearly one-half of which is under cultivation; pop. about 26,000. The surface is rugged, and in some parts mountainous. The climate is mild and healthful. The soil is in general very fertile. The principal vegetable productions are firs, palms, vines, pineapples, oranges, potatoes, cabbages, maize, and wheat. The chief object of agriculture is the vine, and the island has produced annually about 200 pipes of wine, and in good seasons from 8,000 to 10,000 pipes, the product of all the islands, have been exported from Fayal. The other most important exports are fruit, especially oranges, and corn. The imports are manufactured goods, cotton twist, flax, coffee, sugar, tea, tobacco, and soap. In 1859, the island was visited by a severe famine, occasioned by the failure of three successive crops. Fayal has the best harbor of all the Azorean group, and a considerable transit trade. About 170 American whalers touch here annually and land the oil of such fish as they have caught in their outward voyage, whence it is shipped for its destination. Capital, Horta, or

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Villa Orta (sometimes improperly called Fayal), a handsome town on the S. E. side of the island, adjoining the harbor before mentioned; pop. 5,000 or 6,000. The steam packets of the British West India mail company regularly call at Horta.

FAYETTE, the name of counties in several of the United States. I. A S. W. co. of Penn., bordering on Maryland and Virginia, and bounded W. by the Monongahela river; area, about 800 sq. m.; pop. in 1850, 39,112. There are two mountain ridges: one called Laurel hill, stretching along the E. boundary of the county; and the other known as Chestnut ridge, a branch of the Alleghanies, traversing its central part. The rest of the surface is mostly undulating. The soil is fertile in the N. W. part, but elsewhere is better adapted to pasturage than to tillage. Iron and bituminous coal are abundant. In 1850 the productions were 696,092 bushels of Indian corn, 304,102 of wheat, 506,335 of oats, 22,096 tons of hay, and 553,555 lbs. of butter. The county contained about 150 mills and factories of various kinds, 84 churches, 10 newspaper offices, and 8,859 pupils attending schools. It is intersected by the national road, and accessible by steamboats on the Monongahela. Organized in 1783, and named in honor of the marquis de Lafayette. Capital, Uniontown. II. A W. co. of Va., bounded N. by the Great Kanawha and Gauley rivers, and N. E. by Meadow river; area, 770 sq. m.; pop. in 1850, 3,955, of whom 156 were slaves. It has a mountainous surface, with several considerable elevations, the highest of which are Gauley and Sewell mountains. Near the Kanawha or New river, which intersects the county, is a remarkable cliff, 1,000 feet high, called Marshall's pillar. The scenery of the county is exceedingly picturesque; the soil is generally good, and among the highlands particularly there are many open tracts of remarkable fertility. Iron ore is the chief mineral. The staples are grain, hay, cattle, and butter, and in 1850 the productions were 111,064 bushels of Indian corn, 8,414 of wheat, 56,037 of oats, 950 tons of hay, and and 56,409 lbs. of butter. There were 6 churches and 96 pupils attending public schools. Value of real estate in 1850, $801,272. Capital, Fayetteville. III. A W. co of Ga., traversed by Flint river; area, 486 sq. m.; pop. in 1852, 8,800, of whom 2,268 were slaves. The surface is mostly level, and the soil, formed by the disintegration of primary rocks, is unproductive. Granite and iron are the principal minerals. The productions in 1850 were 318,113 bushels of Indian corn, 34,365 of oats, 54,456 of sweet potatoes, and 4,253 bales of cotton. There were 12 churches, and 300 pupils attending public schools. Capital, Fayetteville. IV. A N. W. co. of Ala., bordering on Mississippi; area, about 900 sq. m.; pop. in 1850, 9,681 of whom 1,221 were slaves. It has a moderately uneven surface, drained by numerous streams, and a productive soil, suitable for corn and cotton. In 1850 it yielded 2,920 bales of cotton, 326,844 bushels of Indian corn, and 65,931 of sweet potatoes. There were 42 churches, and 689 pupils attending public schools. Capital, Fayette Court House. V. A S. E. co. of Texas, intersected by the Colorado river, which is navigable during half the year as far as La Grange, the county seat; area, 1,025 sq. m.; pop. in 1858, 9,457, of whom 2,854 were slaves. The surface is undulating, and the soil, consisting of a black sandy loam, is highly productive. In 1850 it yielded 116,030 bushels of Indian corn, 1,194 bales of cotton, 4,830 lbs. of tobacco, and 36,255 of butter. There were 4 churches, 1 newspaper office, and 270 pupils attending public schools. Coal is the most important mineral production. VI. A S. W. co. of Tenn., bordering on Mississippi, and watered by Loosahatchie and Wolf rivers; area, about 550 sq. m.; pop. in 1850, 26,719, of whom 15,264 were slaves. It has a fertile, well cultivated soil, and in 1850 yielded larger crops of sweet potatoes and cotton than any other county of the state. The productions in that year amounted to 28,302 bales of cotton, 963,945 bushels of Indian corn, 113,595 of oats, 111,697 of sweet potatoes, and 143,792 lbs. of butter. There were 50 churches, and 1,246 pupils attending public and other schools. Capital, Somerville. VII. A central co. of Ky., and the second of the state in population, bounded S. by Kentucky river, and drained by some of its affluents; area, about 300 sq. m.; pop. in 1850, 22,735, of whom 10,889 were slaves. It has a rolling surface, and a fertile and well tilled soil, underlying which is an excellent species of building stone called blue or Trenton limestone. The staple productions are grain, hemp, cattle, horses, and swine. In 1850 the county yielded 1,579,598 bushels of Indian corn, 73,074 of wheat, 169,667 of oats, and 2,967 tons of hemp. There were 27 churches, 3 newspaper offices, and 1,675 pupils attending public and other schools. Capital, Lexington. VIII. A S. W. co. of Ohio, intersected by two lines of railroad; area, 414 sq. m.; pop. in 1850, 12,726. It has a level or undulating surface, and a fertile soil, consisting of deep black loam. Grain, hay, and cattle are the chief staples, and in 1858 the county produced 2,257,752 bushels of Indian corn, and 258,920 of wheat. In 1850 there were 21 churches, 1 newspaper office, and 2,090 pupils attending public schools. Capital, Washington. IX. An E. co. of Ind., one of the first of the state in population and improvements; area, about 200 sq. m.; pop. in 1850, 10,217. The surface is level or undulating, and the soil fertile. The chief staples are grain, cattle, and swine. In 1850 the productions were 945,614 bushels of Indian corn, 93,469 of wheat, 43,538 of oats, and 4,691 tons of hay. There were 27 churches, 2 newspaper offices, and 2,346 pupils attending public schools. Limestone is the principal rock. The Whitewater canal and a railroad connecting the county with Cincinnati, Ohio, intersect it. Organized in 1819. Capital, Connersville. X. A central co. of Ill., intersected

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by Kaskaskia river; area, 640 sq. m.; pop. in 1855, 9,592. The surface is level, and occupied by alternate tracts of fertile prairie and good timber land. The productions in 1850 were 398,765 bushels of Indian corn, 18,277 of wheat, 88,427 of oats, and 146,188 lbs. of butter. There were 4 churches, 1 newspaper office, and 900 pupils attending public schools. The central railroad of Illinois passes through the county, and a number of small streams supply it with water power. Capital, Vandalia. XI. A N. E. co. of Iowa; area, 720 sq. m.; pop. in 1856, 8,357. It is drained by the head branches of Turkey river, is well supplied with water power, and has a healthy climate. The surface is undulating, and occupied partly by fertile prairies, and partly by forests. In 1856 the productions were 279,044 bushels of Indian corn, 94,560 of wheat, 64,386 of oats, 43,835 of potatoes, and 72,657 lbs. of butter. Capital, West Union.

FAYETTEVILLE, a post town and capital of Cumberland co., N. C., situated on the W. bank of Cape Fear river, at the head of natural navigation, 60 m. S. from Raleigh, and 100 m. N. W. from Wilmington; pop. in 1850, 4,648; in 1853, about 7,000. It is one of the largest towns in the state, the centre of an active trade, and the seat of manufactures of some importance. The cape Fear river has been rendered navigable by means of locks and dams as far as the coal mines of Chatham co., and plank roads have been constructed leading to various parts of the interior. The pine forests which cover much of the adjacent country furnish large quantities of lumber, tar, and turpentine for exportation. The town has several turpentine distilleries, cotton factories, and grist mills. It contains a large United States arsenal of construction, covering about 50 acres of ground, and in 1850 had 3 newspaper offices and 3 banks. Fayetteville was settled in 1762, and before receiving its present name in 1784 was known successively as Campbelltown and as Cross Creek. In 1831 it was partly destroyed by a great fire, and nearly $100,000 was subscribed for its relief by the people of the United States.

FAYOOM, Fayoum, Fayum, Faioom, or or Faioum (Copt. *Phioum*, "the waters"), a valley and province of central Egypt, about 40 m. S. W. of Cairo, on the W. side of the Nile; length from E. to W. 38 m.; breadth 31 m.; pop. about 65,000. It is of oval form, and in all parts much lower than the Nile. It is well irrigated both by natural water courses and by a number of canals, the chief of which is the Bahr-Yussuf, or canal of Joseph. It was anciently the garden of Egypt, and is still prolific of corn, cotton, apricots, figs, grapes, olives, and roses. At the N. end is the Birket-el-Keroun, which was long erroneously thought to be identical with Lake Mœris. The principal town is Medinet-el-Fayoom (*Crocodilopolis*, afterward *Arsinoë*), near which several broken columns of red granite, carved in old Egyptian style, with lotus bud capitals, mark the long disputed site of the famous labyrinth described by Herodotus. This remarkable monument formerly communicated with the brick pyramid of Howara, which stands a little N. of it, and which, before it was partly destroyed to furnish material for other buildings, was 348 feet square at the base. It is now about 300 feet square and 106 feet high.

FAZY, Jean James, a Swiss statesman, born in Geneva, May 12, 1796. He completed his education in France, wrote several treatises on political economy, and was extensively connected with journalism in Paris (and afterward in Switzerland) where his radical opinions involved him in difficulties with the French government. After his return to Geneva, he took an active part in the establishment of a new constitution, which was adopted June 7, 1842, and in the attempt of his party (Feb. 13, 1843) to overthrow the government. He afterward became a member of the great council, distinguishing himself as the principal champion of the introduction of trial by jury, which institution was adopted, Jan. 12, 1844. In 1846 the radicals became exasperated at the neutrality observed by the Genevese government in the conflict between the Catholic and Protestant cantons. A revolution broke out (Oct. 5), a provisional government was established (Oct. 9), and Fazy, who placed himself at its head, became the ruling spirit of the new grand council of Geneva. The constitution now in force in Geneva was completed by this council, the demolition of the fortifications of the city of Geneva was proposed, and carried into effect in 1850, a national institution for arts and sciences was founded, and Geneva was embellished under the direction of Fazy, who also gave a powerful impulse to the construction of railways and telegraphs. He insisted upon an unrelenting opposition to the Catholic league, and upon the unflinching application of democratic institutions in all the departments of the government; as a delegate of Geneva in 1847 he exerted himself in behalf of the new federal constitution, which was adopted Sept. 12, 1848. From Feb. to Dec. 1848, he was out of office, owing to disagreement with some of his colleagues; but with this exception he was uninterruptedly at the head of the Genevese government until Nov. 14, 1853, when a coalition of the moderate democrats and the old conservatives displaced him from power. But after having officiated in 1853 as vice-president of the federal council of states, he became its president in 1854, and in 1855 he was reinstated in his former position of president of the government of Geneva, which he continues to hold (1859). In the Neufchâtel question he firmly opposed the pretensions of Prussia, and he opposed in 1849 as well as in 1858 the attempts of the federal government to molest the political refugees in Switzerland.

FEATHER GRASS (*stipa pennata*, Willd.), a grass readily distinguishable by its elegant and feather-like awns. It grows in close, matted tufts, having very long, fine, wiry, dark green

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leaves, numerous tall flower stalks with small florets, succeeded by an abundance of sharp-pointed elliptical grains, each of which is surmounted by the feathered awn or bristle of a foot or more in length. This is of a rich bird of paradise color, and gives a remarkable beauty to the plant. Gerarde, a famous herbalist in 1597, informs us that these awned seeds were worn in his time by "sundry ladies instead of feathers." It is this species which is the principal grass in those portions of the steppes of Asia called the *trucu* or pasturing grounds, growing in immense quantities, and developing its woody root stocks above the soil, much to the annoyance of the mower. The seeds of this beautiful grass are frequently imported from abroad and sold in our seed shops, but they seldom vegetate.

FEATHER RIVER, a stream rising in the N. E. part of Plumas co., California, which flows S. W. and S. through a rich gold region, and empties into the Sacramento, 30 m. above Sacramento City; length about 180 m. It is navigable as far as Marysville, to which point steamboats ascend from San Francisco. The Middle and South forks, and Yuba river, are its principal tributaries.

FEATHERS, a complicated modification of the tegumentary system, forming the external covering or plumage of birds. Though chemically similar to and homologous with the hair of mammals, their anatomical structure is in some respects different. An ordinary feather is composed of a quill or barrel, a shaft, and a vane or beard consisting of barbs and barbules. The quill, the part attached to the skin, is a hollow cylinder, semi-transparent, composed of coagulated albumen, resembling horn both in appearance and chemical constitution; it is light, but strong, terminated below by an obtuse extremity pierced by an opening, the lower umbilicus, through which the primary nutritive vessels enter; above, it is continuous with the shaft, with which it communicates internally by an opening, the upper umbilicus; the cavity contains a series of conical shrivelled membranes, fitting one upon the other, that have formerly been subservient to the growth of the feather. The horny substance is generally arranged in longitudinal fibres internally, and in circular fibres externally; hence the greater ease of making a good pen after the external layer has been scraped off. The shaft is more or less quadrilateral, gradually diminishing in size to the tip; it is always slightly curved, convex above, and the concave lower surface, divided longitudinally by a groove, presents 2 inclined planes meeting at an obtuse angle; it is covered by a thin horny layer, and contains in its interior a white, soft, elastic substance, called the pith, which supplies strength and nourishment to the feather. The vane consists of 2 webs, one on each side of the shaft, each web being formed of a series of laminæ or barbs, of varying thickness, width, and length, arranged obliquely on the shaft, and composed of the same material; their flat sides are placed close to each other, enabling them to resist any ordinary force acting in the direction of their plane, as the impulse of the air in the act of flight, though yielding readily to any force applied in the line of the shaft. The barbs taper to a point, but are broad near the shaft, and in the large wing feathers the convexity of one is received into a concavity of another; but the barbs are kept in place chiefly by barbules, minute curved filaments arising from the upper edge of the barb, as the latter does from the shaft; there are 2 sets, one curved upward and the other downward, those of one barb hooking so firmly into those of the next as to form a close and compact surface; in the ostrich the barbules are well developed, but are long, loose, and separate, giving that soft character conveyed by the term plume. The barbules are sometimes provided with a similar apparatus on their sides called barbicels, as in the quills of the golden eagle and albatross; these serve to keep the barbules in position, but are less numerous than the latter. In most feathers there is an appendage near the upper umbilicus of a downy character, called the accessory plume; small in the quills of the wings and tail, in some body feathers of hawks, ducks, and gulls it is of large size, in some species as large as the feather which supports it; in the emu 2 plumy feathers arise from one quill, and sometimes 3 in the cassowary, the additional plumes being these accessory feathers; in the ostrich there is no such additional tuft. There is, therefore, every gradation from a simple barrel and shaft, as in the cassowary's quills, to the feather with barbs, barbules, and barbicels; some feathers are all downy, like the abdominal ones of the eagle-owl; others have very little down, as the harsh plumage of the penguin; in the eider duck, and other arctic species, there is at the base of the common feathers a soft downy covering, securing warmth without weight, like the soft fur at the base of the hair of arctic mammals; young birds are covered with down before the development of feathers, the latter being guided through the skin by the former. In the chick the formation of down begins on the 8th day of incubation, and is continued until the hatching; 10 to 12 radiating filaments are formed at the same time in an epidermic sheath, which soon after birth dries and sets free the plumes, allowing them to spread out as a pencil of down; a stem is developed, and the downy filaments become the primary web of the feather. Feathers in some cases resemble stiff bristly hairs, as about the bill in most birds, and the tuft on the breast of the wild turkey. In the genus *dasylophus*, peculiar to the Philippine islands, we have remarkable instances of the modifications of the epidermic covering of birds. In *D. Cumingii* (Fras.), the feathers of the crest, breast, and throat are changed at their extremities into ovoid horny lamellæ, looking like shining black spangles, expansions of the true horny structure of the shaft; something of the kind is seen in

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the Bohemian chatterer or wax-wing (*ampelis garrulus*, Linn.), in which some of the secondary and tertial quill feathers end in small, oblong, flat appendages, in color and consistence resembling red sealing wax, which are also expanded horny prolongations of the shafts of the ordinary feathers. In *D. superciliosus* (Cuv.), the only other species of the genus, the feathers over each eye are changed for three-fourths of their length into red silky hairs or bristles, the base of the feather having the usual appearance; each shaft seems to divide into several of these hair-like filaments, which are finer and more silky than the appendage on the breast of the turkey, and directly continuous with ordinary feather structure, while in the turkey there is a complete transformation of feathers into hairs in the whole extent. In most birds there will be found a number of simple hair-like feathers scattered over the skin after they have been plucked; they arise from short bulbs as slender rounded shafts. Feathers are developed in depressions in the skin lined by an inversion of the epidermis, which surrounds the bulb; they grow by the addition of new cells from the bulb, which become modified into the horny and fibrous stem, and by the elongation and extension of previously formed cells; like the hair, they originate in follicles producing epidermic cells, though when fully formed the cellular structure is widely departed from except in the medullary portion. They are, when first formed, living organized parts, developed from a matrix connected with the vascular layer of the skin, and growing by nutrient vessels; when fully developed, the vessels became atrophied, and the feathers dry and gradually die from the summit to the base, so that at last they become dead foreign bodies, as completely incapable of vital modifications as the perfect horns of the deer. The matrix which produces the feather, according to Owen, has the form of an elongated cylindrical cone, and consists of a capsule, a bulb, and intermediate membranes which give proper form to the secretion of the bulb; as the conical matrix sinks into and becomes more intimately connected with the true skin, its apex protrudes above the surface, and the investing capsule drops off to give passage to the feather which has been growing during this period; the capsule is made up of several layers, the outermost consisting of epidermic cells, and its centre is occupied by a soft fibrous bulb freely supplied with blood vessels from below and a nerve; between the bulb and the capsule are 2 parallel membranes, in whose oblique septa or partitions the barbs and barbules are developed, nearly in the same way that the enamel of the teeth is formed between the membrane of the pulp and that of the capsule, as has been remarked by Cuvier. For the complicated manner in which the stem is formed, the reader is referred to the article "Aves," by Prof. Owen, in the "Cyclopædia of Anatomy and Physiology." Suffice it to say here, that the part to which the barbs are attached and the pith of the shaft are formed respectively from the outer and inner surfaces of the membranes of the compound capsule; the shaft and barbs at the apex of the cylinder become hardened first, and are softer the nearer the base of the matrix; the first formed parts are pushed forward by the cell growth at the base, the products of the bulb being moulded into shape by the membranes exterior to it; the successive stages of the growth of the medullary matter are indicated by a series of membranous cones or cups, the last formed of which cannot escape from the hardened and closed shaft, and constitute the light dry pith seen in the interior of the quill; these cones are originally connected together by a central tube, and the last remains of the bulb are seen in the ligament which passes from the pith through the lower umbilicus, attaching the quill to the skin. Feathers grow with great rapidity, and in some birds to a length of more than 2 feet; they are almost always renewed annually, and in many species twice a year; this amount of formative power demands a considerable increase of the cutaneous circulation, making the season of moulting always a critical period in the life of a bird. The plumage is generally changed several times before the bird is adult; but some of the falcons are said to assume the mature plumage after the first moult, as the Greenland and Iceland falcons.—Feathers serve to protect birds from injurious external influences, such as extremes of cold and heat, rain, &c., for which their texture and imbricated arrangement admirably adapt them; and they also furnish their principal means of locomotion, in the latter case being stronger, more compact, and longer than those which cover the body. They generally increase in size from the head backward, and have received special names according to the region of the body, which are important aids in describing and recognizing species. Some of these names, constantly used in the ornithological articles of this Cyclopædia, not readily understood from the words themselves, are as follows: the scapulars, above the shoulder blade and humerus, apparently on the back when the wing is closed; axillaries, long and straight feathers at the upper end of the humerus, under the wing; tibials, covering the leg; lesser wing coverts, the small feathers in rows upon the forearm; under coverts, lining the lower side of the wings; the largest quill feathers, arising from the bones of the hand, are the primaries; the secondaries arise from the outer portion of the ulna, and the tertiaries from its inner portion and the humerus; the bastard wing consists of the quills growing from the rudimentary thumb; greater wing coverts, the feathers over the quills; tail coverts, upper and under, those above and below the base of the tail feathers. The relative size of the quills on the hand and forearm, and the consequent form of the wings, are characteristic of the families of birds, and modify essentially

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their powers of flight. The breadth of the wing depends principally on the length of the secondary quills, and its length on that of the primaries. Leaving out of view the proportions of the bones and the force of the muscles of the wings, when the primaries are longest at the extremity of the pinion, as in the falcons and swallows, causing an acuminate form of wing, we may know that the powers of flight are great, requiring comparatively little exertion in the bird; but when the longest primaries are in the middle of the series, giving rise to a short, broad wing, as in the partridge and grouse, the bird can fly only a short distance at a time, with great effort, and a whir well known to the sportsman. Not only the shape of the wing, but the close texture of its feathers, must be taken into account in the rapid strong flight of the falcon; the loose soft feathers of the wings in the owls, and the serrated outer edge of the primaries, while they prevent rapid flight, enable them to pounce noiselessly upon their vigilant prey. The structure of feathers affords some of the most striking instances of the adaptation of means to ends, and Paley early drew attention to the proofs they offer of creative wisdom and design.—Most birds, and especially the aquatic families, are provided with an oil gland at the base of the tail, whose unctuous secretion is distributed over the feathers by means of the bill, protecting their surface against moisture; the shedding of the water is not owing entirely to the oily covering, but also to a thin plate of air entangled by the feathers, and probably also to an actual repulsion of the particles of water by the feathers, as is seen in the leaves of many aquatic plants; the arranging of the plumes by the bill of the bird being rather to enable them to take down a large quantity of air, than to apply any repulsive oily covering.—The plumage of birds has an infinite variety of colors, from the sombre tints of the raven to the pure white of the egrets, and the gorgeous hues of the lory, toucan, trogon, and humming birds; the females have generally less lively colors, and the summer livery of both sexes is often different from that of winter. One of the most curious phenomena connected with feathers is the annual moult, and the change of color during that and the breeding season; moulting usually takes place after the young have been hatched, the whole plumage becoming dull and rough, and the bird more or less indisposed, with a temporary loss of voice in the singing species.—According to Mr. Yarrell, the plumage of birds is changed by the mere alteration of the color of the feathers; by the growth of new feathers without the loss of any old ones; by the production of new feathers in the place of old ones thrown off, wholly or in part; and by the wearing off of the light tips as the breeding season approaches, exposing the brighter tints underneath. The first two of these changes occur in adults at the end of spring, the third being partial in spring, and complete in autumn. Though the perfect plumage is non-vascular and epidermic, the colors change, probably by some vital process, without the loss of a feather; when the winter livery succeeding the autumnal moult begins to assume its bright characters, the new color generally commences at the part of the web nearest the body, and gradually extends to the tip. Until within the last few years the changes of color in the fur of mammals (as in the ermine in winter), and in the plumage of birds in the season of reproduction, were supposed to be effected by the simple reproduction of the hairs and feathers; but this cannot be the case, as many facts go to prove that these changes occur at other times than the period of moulting, and without the loss of a hair or feather. It is well known that vivid emotions of fear or grief may turn the human hair gray or white in so short a period that there could be no change in the hair itself to account for it; and a case is on record of a starling which became white after being rescued from a cat. It has been maintained by Schlegel and Martin that many birds always get their wedding plumage without moulting. (For observations regarding this, see a paper by Dr. Weinland, in the "Proceedings of the Boston Society of Natural History," vol. vi. p. 33.) The fact being admitted, how can the change of color be explained in the mature feather, which has no vascular or nervous communication with the skin? The wearing away of the light tips, mentioned by Mr. Yarrell, is not only unphysiological, but in most cases does not happen. Dr. Weinland, from the examination of bleached specimens in museums, and of recent birds, expresses the belief that the brightness and fading of the colors are owing to the increase or diminution of an oily matter in the feathers; the microscopic examination of the web of feathers from the breast of a fresh merganser (*M. serrator*, Linn.) showed numerous *lacunæ* of a reddish oil-like fluid; some weeks after, the same feathers, having become nearly white from exposure to light, disclosed air bubbles instead of the reddish fluid; from this he concludes that the evaporation of the oily fluid, and the filling of the spaces with air, as in the case of the white water lily, produces the changes of color. If this fluid be oily, as there is good reason to believe, mere physical imbibition would be sufficient to introduce it into the dead feathers, as it is well known that fat passes through all tissues very readily, even through compact horn. In the season of reproduction, the nutritive and organic functions are performed with their utmost vigor, and the supply of fatty coloring matter would flow freely to the feathers; under the opposite conditions of debility, cold, or insufficient food, the oily matter would be withdrawn and the feathers would fade.—In regard to the value of feathers to man, it will be sufficient to enumerate the ornamental employment of the plumes of the ostrich, egrets, cranes, and peacock; the economical uses of the down of the eider duck and the plumage of the goose; the importance of the goose quill before the introduction

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of steel and gold pens, and the adherence of many at the present day to the more perishable, less convenient, but softer-moving quill; not to more than allude to the consumption of the plumage of the gorgeous tropical birds in the manufacture of feather flowers, and the utility of the downy arctic skins as articles of dress in the regions of perpetual snow.

FEBRUARY (Lat. *Februa*, the festival of expiation and lustration, which was held on the 15th of this month), the second month in our present calendar, containing 28 days ordinarily, and 29 days in leap year. It was not in the Romulian calendar, but was added at the end of the year by Numa, and was first placed after January by the decemvirs in 452 B. C.

FEDERALISTS, a political party in the United States who claimed to be the peculiar friends of the constitution and of the federal government. Their opponents, the republicans, they called anti-federalists, and charged them to a certain extent with hostility to or distrust of the United States constitution and the general government. The republicans, however, strenuously denied the truth of these charges. The federalist party was formed in 1788. Its most distinguished leaders were Washington, Adams, Hamilton, and Jay; and the leading federalist states were Massachusetts and Connecticut, supported generally, though not uniformly, by the rest of New England; while Jefferson, Madison, Monroe, Burr, and Gallatin led the opposition. In the contests of the French revolution the federalists leaned to the side of England, the republicans to that of France. The former were defeated in the presidential election of 1800, when the republican candidates were elected, Jefferson president, and Burr vice-president. Their opposition to the war of 1812, and above all, the calling of the Hartford convention, completed their destruction as a national party. In 1816 Monroe, the republican candidate for president, received the electoral votes of all the states with the exception of Massachusetts, Connecticut, and Delaware, which gave 34 ballots against him, while from the other states he received 183 votes. At the next election in 1820 the federalist party was completely disbanded, Monroe receiving every electoral vote except one.

FEDERATION, or CONFEDERATION, a league or union of several sovereign states, generally under the direction of a supreme government. Federal unions were formed very early in history, and were common in antiquity, especially among the Greeks. The most famous of these, the Amphictyonic league, embraced 12 states or tribes, whose deputies met twice a year—at Delphi in the spring, and in the autumn at a temple near Thermopylæ. Similar leagues existed among the Greek colonies in Asia Minor. The Æolian federation possessed Lesbos, Tenedos, and other islands, and on the mainland 12 confederated cities, of which the chief were Cyme and Smyrna. The Ionian federation also comprised 12 cities, the principal of which were Ephesus, Colophon, Miletus, Priene, Phocæa, Samos, Teos, and Chios, the last 3 being the capitals of islands of the same names. The Dorian league was composed of the 6 cities of Halicarnassus and Cnidus on the mainland of Asia Minor, Cos in the island of Cos, and Halyssus, Camirus, and Lindus in the island of Rhodes. Another famous Greek federation was the Achæan league, formed 281 B. C. by 4 cities, which were gradually joined by others, until in 191 B. C., when Sparta was admitted to the federation, it comprised nearly all the Peloponnesian states, together with several cities of northern Greece. The Phœnician cities, during nearly the whole of their national existence, formed a federation, of which the 3 principal members were Tyre, Sidon, and Aradus. In Italy, the most celebrated federation was that of Etruria, which existed from a very remote period, and embraced 12 cities. It flourished for several centuries, but finally yielded to the power of Rome about 280 B. C.—In modern times the first great federation was the German empire, which was formed in 843, and in 962 took the title of holy Roman empire of Germany. It lasted till 1806, when the last emperor, Francis, renounced the title of emperor of Germany, having 2 years previously taken that of emperor of Austria. Shortly before its dissolution several of the German states formed the confederation of the Rhine, under the protection of Napoleon I. This league fell with the French empire, and was succeeded in 1815 by the present Germanic confederation. By consolidating, or mediatizing, as it was termed, a multitude of smaller states, the number of German sovereignties was reduced from several hundreds to 38, embracing 34 monarchical states and the 4 free cities of Lübeck, Frankfort, Bremen, and Hamburg. The principal monarchical states of the confederation are the empire of Austria, and the kingdoms of Prussia, Bavaria, Hanover, Saxony, and Würtemberg. The federation of the Hanse towns, or the Hanseatic league, was formed in the 13th century by some of the maritime cities of Germany for the purpose of protecting their commerce against pirates and against the nobles and princes. At the height of its prosperity it comprised 85 cities. In the 14th and 15th centuries this federation was of high political importance, but it declined as order and good government advanced in the states of Europe. The last diet of the league was held at Lübeck in 1630, when the federation was dissolved. The Swiss federation, which has lasted for more than 5 centuries, now consists of 22 sovereign cantons, and its affairs are controlled by a diet of deputies chosen by the states. The United States of America afford the most striking example to be found in history of the successful working of a federation on a grand scale. The attempts to imitate them made by the Spanish American republics have proved failures, and have resulted for the most part in the abandonment of the federative system and the establishment of consolidated governments.

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FEDOR (or FEODOR) I., IVANOVITCH, czar of Russia from 1584 to 1598, the last of the house of Rurie. His father, Ivan the Terrible, a monster of violence and cruelty, had broken the independent spirit of his nobles and cities by massacres unparalleled in history, and had aggrandized the state in wars with Poland, Sweden, and the Tartars. Fedor was weak, both in mind and body, and his brother-in-law Godunoff, member of the council of state, a man of enormous riches, of rare energy and ability, ambitious, enterprising, and unscrupulous, bore most of the cares of the government. The most remarkable events of this reign are the extension of serfdom; the establishment of an independent Russian patriarchate, consecrated by Jeremy, patriarch of Constantinople; the completion of the conquest of Siberia, which had been given to Ivan by the robber and adventurer Yermak; the surrender of Esthonia to Sweden; an incursion and defeat of the khan of the Crimea; the commencement of diplomatic relations with distant states, particularly with England; an attempt made to gain influence in Caucasia, and another to unite Poland and Russia by the proposed election of Fedor to the throne of Poland, in return for which the conquest and annexation to Poland of Moldavia, Wallachia, and Hungary were promised by Godunoff. In order to secure his own succession to the throne, Godunoff is believed to have hired assassins to murder the czar's young brother Demetrius, who was with his mother at Uglitch. The deed was followed by a series of horrible crimes and of revolts under the lead of false Demetrii, which convulsed Russia long after the death of Fedor.

FEE (SAX. *feh*, or more accurately *feoh*, compensation or payment). As landed estates were given by the northern conquerors of the Roman provinces to their nobles and soldiers as compensation or wages for military service, fee came to mean the estate itself. It was Latinized into *feudum*, or *feodum*, from which the word feudal arose, because it was this tenure of land which characterized what is called the "feudal system." The derivation and original meaning of this word are not certainly known, but what we have given is, we think, supported by the best reasons. In law, estate does not mean the land, but the title which a man has in the land; so the word fee is now used to signify, not the land held in fee, but the kind of estate which a man has in land, or the tenure by which he holds it. The word fee alone means an estate without qualification or limitation; hence the phrase fee simple means the highest estate held of any superior or lord, or by any tenure or service, or strictly speaking, by any tenure whatever; and the word simple means only that nothing is added to limit or condition the word fee. Hence an estate in fee and an estate in fee simple are the same thing. This is an absolute estate of inheritance; or an estate which a man holds, descendible to his heirs for ever. There is no event by which it must be terminated or defeated, and no limitation or restriction by force of which it must descend to a certain heir or heirs, in exclusion of the rest. A fee simple may be acquired by descent or by purchase. In law, purchase means every mode of acquiring land except descent; hence if land be given to a man, or devised to him, and he takes by gift or by devise, still he is said in law to take by purchase. The essential words in any instrument by which a man should take land in fee, whether by will or deed, are, to the grantee, or devisee, and "his heirs." For if land be given to a man without the word "heirs," he takes only an estate for his own life, and at his death (if there be no remainder over) it reverts to the grantor or his heirs; and at common law, there are no words which could supply the want of these "words of inheritance," as they are called, where there could be heirs. Thus, if land were conveyed or devised to a man "and his successors," he took only an estate for life; but if these words were used in a deed or devise to a corporation, they were the proper words to create a fee simple, because a corporation should have perpetual succession, but cannot have heirs. If land be granted or devised to A, B, and C, as trustees, then also the word successors would in general carry a fee. The ancient severity of the rule requiring words of inheritance is now relaxed somewhat in England, and more in the United States (in some of the states by statute), especially in respect to wills and trusts. In wills, any words distinctly indicating the purpose of the testator to devise all his estate and interest in a piece of land, are always held now to carry a fee simple; and in trusts, if one has land given to him with power to sell, this is held to be a power to convey in fee simple. In deeds it is always better to add the words of inheritance, but the word "assigns" is not necessary to give the power of transfer, although usually added. There may be a fee simple not only in lands, but in franchises and liberties; and in England, in dignities and the rights and privileges attached to them; and even in personal property, as in an annuity.—Fees may be less than fee simple, and they are so whenever not simple; that is, whenever the fee is in any way restrained or diminished. A qualified fee, technically so called, is one in which, by an original limitation, the land goes to a man and his heirs general, and yet is not confined to the issue of his own body; as if it be given him and to his heirs on the part of his father or a certain ancestor. A determinable fee is a fee which may continue for ever, but which may be determined by the happening of some event which is uncertain. Instances usually given of this are lands conveyed or devised to a man and his heirs until an infant shall attain a certain age, or until such a person shall be married, or shall have children. A conditional fee means either a fee to which at its origin some condition was annexed, which being performed will defeat the estate, or the performance of which is necessary to preserve the estate, or the per-

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formance or occurrence of which is necessary to vest the estate. But these three phrases are not definable with exact accuracy, and are sometimes used one for the other. Fee tail is a law term of more precise meaning. It is derived from the Norman French word *tailler*, to cut, because it is a lesser estate of inheritance cut or carved out of the fee simple. The words which create a fee tail are to a man and "the heirs of his body," or to a woman and "the heirs of her body." By virtue of these words, the first taker, whether by devise or grant, takes only an estate for his own life, with a remainder in tail to the heirs of his body, which means his eldest son; and as he takes nothing else, he can give nothing else or more; and at his death his son comes into possession of a similar estate for his own life, with a remainder in tail to his son. Entailed estates were very common in England; but ways were devised long since, even there, for breaking them up. In Ireland and in Scotland they had more force and effect; and were found to be so offensive that by the recent legislation of the British parliament they may now be broken in those countries about as easily as in England. In the United States estates tail have had no practical existence since the revolution. In some of the states they are wholly unknown. In others they become at once, by force of statutory provision, estates in fee simple. In others a tenant in fee tail bars the entail by a simple conveyance in fee simple. In yet others, and they are numerous, they are simply abolished by statute, without any reservation whatever.

FEEJEE, Fiji, or Viti Islands, a group in the south Pacific ocean, lying between lat. 15° 30′ and 20° 30′ S. and long. 177° E. and 178° W., including among others what were called by their discoverer, Tasman the Dutch navigator, Prince William's islands and Heeniskirk's shoals, and extending over an ocean area of about 40,000 sq. m. Some geographers class Feejee with the Tonga islands, entitling them both the Friendly islands. These two groups, however, differ from each other geologically, and the Feejeeans are dissimilar to the Tongans in physical conformation, language, and mythology. The Feejee islands were discovered in 1643, after which date they remained unvisited until Capt. James Cook lay to off an island in the windward group, to which he gave the name of Turtle island. In 1789 Capt. Bligh, in the launch of the Bounty, saw a portion of them, and in 1792, when in command of the Providence, passed among them. There are 225 islands, about 80 of which are inhabited. The population has been variously estimated at from 130,000 to 300,000. Two of the islands only are of considerable size, namely, Viti Levu (Great Feejee) and Vanua Levu (Great land). The former measures 90 m. from E. to W. and 50 from N. to S., and is supposed to contain at least 50,000 inhabitants. The latter is more than 100 m. long, with an average breadth of 25 m.; its population is estimated at 31,000. The most important and populous of the smaller islands are Ovolau, on which most of the white residents live, Kandavu, Taviuni, Vana or Sonosomo, Koro, and Mbau. The islands are mostly of volcanic origin, but there is no active volcano on the group. Coral isles are, however, not wanting. Earthquakes are frequent, and hurricanes periodical and destructive. The highest mountains are on Viti Levu, and reach an elevation of 4,000 to 5,000 feet. On Vanua Levu are 5 hot springs, the temperature of which is about 200° to 210°. The natives boil their yams in them in 15 minutes. The islands are very dangerous of access on account of the shoals and reefs by which they are surrounded. Hydrographical charts were made by the U. S. exploring expedition under Capt. Wilkes (1840), and Capt. Denham of the British ship Herald has recently been engaged in a more accurate survey than had before been made. From observations taken by Wilkes's expedition it was found that the temperature was very equable. The mean temperature at Ovolau during a period of 6 weeks was 77.81°; the lowest was 62°, the highest 96°. The greatest extremes of heat and cold are experienced inland. A temperature of 121° was noted by a missionary in Vanua Levu. The mean temperature of the group has been estimated at about 80°. Considering the proximity of these islands to the equator, the climate is not so pernicious to white men as might be expected. It is debilitating, but not deadly. In December, January, and February the heat is oppressive. From April to November the prevalent winds blow from E. N. E. to S. E.; during the rest of the year the winds are variable. The north wind is very disagreeable; it is a hot blast rarefying the air and rendering respiration difficult. February and March are the months most feared by seamen; these are called the "hurricane months." The soil is a deep yellow loam; and the tropical climate and abundance of water cover the mountains up to their very summits with a luxuriant vegetation. Plants grow with marvellous rapidity. Turnips, radishes, and mustard after being sown 24 hours are above the surface, and in 4 weeks are fit for use. Of the bread-fruit tree there are 9 native varieties; of the banana, 6; of the plantain, 3; of the cocoanut, 3. The Tahiti chestnut and papaw apple are found wild, also shaddocks red and white, a bitter orange, many sorts of plums, and the Malay apple. The vegetation of the E. and W. Pacific seems to meet at this central point. The tea plant of China, the cocoanut, caraway, nutmeg, sugar cane, arrow root, capsicum, sarsaparilla, Cape gooseberry, and pineapples flourish. The chief edible roots are the yam and the taro, of which large quantities are raised. Considerable care is bestowed upon the cultivation of the yangona (kava), which yields the native intoxicating drink. The indigenous turmeric is copiously used by the women in coloring their persons. Cotton grows wild; so does the paper mulberry of which the natives make their tapa cloth. Two kinds of tomato and two kinds of nut are found. The *pandanus*,

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whose root is sometimes entirely disconnected with the ground and leans upon a cluster of supplementary props, is the vegetable curiosity of Feejee. Many of the islands are well adapted for coffee. The botanists of the U. S. exploring expedition, on a very imperfect examination, arising from the impossibility of penetrating into the interior, gathered 650 species of plants. The coast fisheries are inexhaustible; turtle catching is the business of several tribes; 50 or 100 turtle caught in a season by one party is deemed successful work. The mountaineers, who live far from the sea-coast, and consequently cannot get fish, substitute snakes as an edible. There are few fowls and hogs. The native agricultural implements are a tool, lancet-shaped and about a yard long, made of hard wood, and used in clearing off the brushwood and coarse grass; a digging stick made of a young mangrove; a hoe for weeding, with a blade of tortoise shell or the valve of a large oyster; a large dibble, 8 feet long and 18 inches in circumference at 2 feet from the point; and a pruning knife made of a plate of tortoise shell lashed to the end of a rod. The Feejeeans were preëminent among Polynesians for their manufactures, as remarked by Capt. Cook. The greater portion of the processes are performed by women. The *masi* or cloth is made of the bark of the malo tree, which is steeped in water. The bark is then beaten on a flat log with a grooved mallet. Two lengths of the wet substance are generally beaten together, and are kept together by their gluten. Separate pieces are stuck together by the starch of the taro, and are then dyed. The women elaborate the borders. Floor, sail, and sleeping mats are made from the leaf of the dwarf pandanus, and a sort of rush. A missionary says: "The wicker-work baskets of Feejee are strong, handsome, and useful beyond any I have seen at home or abroad." Nets are made of the vine of a creeper or of sinnet. The fishing nets are weighted by shells. Sinnet is composed of the fibre of the cocoanut husk, and furnishes the native with his material for fastening and wrapping. The Feejees understand pottery, for which they employ red and blue clays tempered with sand. Lines and figures are traced on the vessels while moist, the work being done exclusively by women. Canoes were formerly built only by a certain caste, but of late this trade has been thrown open; they seldom exceed 100 feet in length. Before the introduction of the American hatchet and the blades and chisels of Sheffield, the only axe of the native mechanic was a hard stone ground to an edge; the spines of echini were his boring apparatus; with rats' teeth set in hard wood he carved and engraved; he still uses the mushroom coral for a file, and the pumice stone for general finishing purposes. The form of the houses in Feejee varies according to locality. In one island a village looks like a clump of square wicker baskets; in another, like rustic arbors; in a third, like oblong hay ricks; and in a fourth the dwellings are conical. Some tribes dispense with centre and side posts, others employ them. The walls are from 4 to 10 feet high. The thatch, which is of wild sugar cane, is often continued to the ground so as to hide the side walls. The doorways are generally so low as to compel the visitor to stoop. The average size is about 12 feet square; the roof about 30 feet high. No one can erect a house without first obtaining, by purchase or otherwise, the permission of the chief of the district. The chief orders the work to be done by the carpenters of the tribe. These dwelling houses are generally regarded as tenantable for 20 years. The inland tribes of Great Feejee export to the coast *yangona*, a liquor which they prepare by chewing a root and spitting the result into pitchers, and receive mats, cloth, and fine salt in exchange. The trade of Feejee with their neighbors, the Tongans or Friendly islanders, dates far back before the arrival of Tasman, and probably originated in the canoes of the Tongans being driven among the windward isles of Feejee by strong easterly winds. The scarlet feathers of a parroquet caught in Somosomo were the leading article of export. The Tongans paid the Somosomans with articles of European manufacture and the loan of their women. In this way iron ware was first introduced into Feejee. The Tongans still procure from Feejee their canoes, spars, sails, pottery, and mosquito curtains, as well as sinnet and various sorts of food, and pay with whales' teeth, necklaces, inlaid clubs, cowries, Tonga cloth, axes, muskets, and their services in war. One consequence of this ancient connection with Tonga is that in several parts of Feejee there are tribes descended from Tongan forefathers, and called Tonga-Feejee. The Feejeeans never returned the visits of the Tongans, and up to this day there is but one instance recorded of a Feejee chief attempting to cross the ocean in his canoe to Tonga. The first commercial intercourse between Europeans and the natives began about 1806. Vessels of the E. I. company visited the N. E. part of Vanua Levu to procure sandal wood and tripang. They paid in iron hoop, spikes, beads, red paint, and similar trifles. The sandal-wood failed before long, and as the natives had not sufficient forethought to plant more, little now remains. Tripang and tortoise shell next became the chief articles of foreign commerce. This traffic has long been conducted chiefly by Americans from Salem, Mass. Tripang is picked up from the reefs to the annual value of $30,000, and recently small lots of arrowroot, cocoanut oil, and sawn timber have been purchased from the islanders. Almost contemporaneously with the earliest visits of the East Indian trading ships, namely, in 1804, a number of convicts escaped from New South Wales and settled chiefly in the neighborhood of Mbau or Rewa, the chiefs receiving them on condition of their support in time of war. These men, 27 in number at the time of their first arrival, were the means of acquiring for Mbau and Rewa

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the political importance in Feejee which they now enjoy. In a few years the greater part of their number had fallen victims to native revenge or to feuds among themselves. Their leader, a Swede named Savage, was drowned and eaten in 1813. In 1824 only two, and in 1840, when Capt. Wilkes visited Rewa, only one survived, an Irishman, known as Paddy Connor; at the close of his life his children numbered 50.—The natives are above the middle height, sleek and portly, with stout limbs and short necks. Their complexion is darker than the copper-colored and lighter than the black races. Their hair is black, long, frizzled, and bushy, sometimes encroaching on the forehead and joined by whiskers to a thick round or pointed beard, to which moustaches are often added. They are almost free from tattooing; only the women are tattooed, and that on the parts of the body which are covered. The men dress in a sort of sash of white, brown, or figured masi, using generally about 6 yards. The women wear a *liku* or fringed band, made of the bark of a tree, the fibre of a wild root, and some kinds of grass. The fringe is from 3 to 10 inches deep. The turban, worn only by the men of the respectable classes, is a fine masi of one thickness only, and has a gauze-like appearance. This is the pagan costume, but when they become Christians both sexes adopt a fuller dress. They bore the lobe of the ear and distend the hole. Both sexes paint their bodies, and seem to prefer red; they also besmear themselves with oil. Of the toilet the hair is the most important part, and is dressed in the most grotesque forms, sometimes attaining the diameter of 5 feet. The chief's barber is held in high respect, and his hands are not allowed to touch food. The hair is colored sometimes with two or more dyes. They are fond of music, and have invented the nose flute, the conch shell, the pandean pipes, a Jews-harp made of a strip of bamboo, and several sorts of drums. The singing is invariably in a major key. They love to dance. The musicians perform on one note, the bass alternating with the air; they then sound one of the common chords in the bass cleff without the alternation. The Protestant missionaries forbid the nocturnal dances as immodest. The natives are fond of poetry. Their verses rhyme, but seldom preserve a uniform measure. In chanting, the chorus is repeated at the end of each line. Few drink to excess. Girls are betrothed at a very early age, and often to old men. Brothers and sisters, first cousins, fathers and sons-in-law, mothers and daughters-in-law are forbidden to speak to each other or to eat from the same dish. The latter prohibition extends to husbands and wives. The common people usually take 2 meals a day, the chief 3 or more. As they abhor drinking after each other from the same cup, they hold the vessel about 10 inches above the mouth, and pour the stream down the throat. They eat with their fingers. Rheumatism is common among them; they relieve the patient by making deep incisions over the part affected.—The islanders are divided into a number of tribes, each governed by its native chief. Of these 8 are paramount, and the rest in a state of vassalage more or less complete. The rule of the chief is absolute and patriarchal. A well defined system of customary law, however, regulates the subordination of one district to another. The king is assisted by a council composed of the elders and men of highest rank. The law of descent is curious. The successor of the king is his next brother, failing whom, his own eldest son or the eldest son of his eldest brother fills his place. But the rank of the mother often causes an infraction of this rule. The person of a pagan high chief is *taboo* or sacred. In some cases they claim a divine origin. Every thing becomes consecrated which the supreme chief or king touches. He works at agricultural labor when otherwise unoccupied, and plaits sinnet. He has always several attendants about his person, who feed him and perform the most servile offices. He has no throne, but squats on the ground like his subjects. A peculiar language is used when speaking of the chief. All his actions and the members of his body are hyperbolized. Respect is indicated by the utterance of a peculiar shout or chant called *tama*. This is uttered by inferiors on approaching a chief or chief town. It is necessary to crouch when a chief passes by. Standing in the presence of the chief is not allowed, and all who move about the house in which he is creep, or, if on their feet, advance bent, as in act of obeisance. No one may cross a chief behind his back. The inferior must pass in front of the superior. On the same principle, when at sea they may not pass the canoe of a chief on the outrigger side. If a chief stumbles or falls, his subjects must do the same. The best produce of the gardens, the best animals, and the best fish are presented to the chiefs. Pay-day is regarded as a high festival. Whales' teeth, women, and canoes are prominent articles of tribute. According to the native ideas of justice, the criminality of an act is in proportion to the rank of the offender. Murder by a chief is less heinous than petty larceny committed by a man of low rank. The most serious offences are theft, adultery, abduction, witchcraft, infringement of a taboo, disrespect to a chief, incendiarism, and treason. Theft is punished by a fine, repayment in kind, loss of a finger, or clubbing. The contumacious are punished by a fine, or loss of a finger, ear, or nose. The other crimes are punished by death, the instrument being the club, noose, or musket. Adultery is the crime most severely visited. The adulterer may be put to death, or he may be compelled to give up his own wife to the aggrieved party, or his property may be destroyed or taken away from him. The principle of vicarious atonement is acknowledged. A man sentenced to death will often surrender his father to suffer in his stead. There is also a species of pecuniary atonement or *soro*, of which there are 5 varieties. The soro with a whale's tooth, a mat, club, musket,

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or other valuable, is the most common. Society is divided into 6 recognized classes: 1, kings and queens; 2, chiefs of large districts or islands; 3, chiefs of towns, priests, and ambassadors; 4, distinguished warriors of low birth, chiefs of the carpenters, and chiefs of the turtle catchers; 5, common people; 6, slaves by war. Rank is hereditary through the female line. The dignity of a pagan chief is estimated by the number of his wives. The rights of the *vasu*, or sister's son, constitute one of the peculiar institutions of Feejee. A vasu of rank can claim any thing in his mother's land, excepting the wives, home, and land of a chief. In the moral and intellectual state of the Feejeeans there is a wide distinction between the pagan and Christian natives. As the majority are yet pagans, their customs, laws, and religion may still be regarded as the national standards of Feejee. Capt. Wilkes says of them: "They are truly wretches in the strongest sense of the term, and degraded beyond the conception of civilized people. For the sake of decency, and to avoid shocking my readers, I have refrained from relating many things which happened under my own eyes." Foremost among their describable vices stands cannibalism; not only are prisoners taken in war consumed, but persons of the same tribe and village fall victims to the greed of their neighbors. The cooked human body is termed in the Feejee language *bakolo* or "long pig." As an English gentleman may send a choice haunch of venison as a complimentary present to another, so one Feejee chief will send a stalwart subject roasted entire like an ox, carefully trussed, and escorted by a procession to the residence of an ally. "It is our only beef," said Thakombau to the British Capt. Erskine. There is one district called Drekete, where the inhabitants from generation to generation are all "preserved" to be consumed by their more powerful neighbors. The epicures of Feejee prefer the flesh of women to that of men, and deem the thick of the arm and the thigh the tit-bits of the *bakolo*. The flesh of white men is held in low repute; it is said to be comparatively insipid or obnoxiously tainted with tobacco. Their practice of appropriating the cargoes and eating the crews of vessels wrecked on their shores, has several times brought down upon them chastisement from ships of war belonging to France or the United States. In 1834 the chief of Viwa captured the French brig L'aimable Joséphine, and killed the captain and most of the crew. This crime was avenged by two French ships of war sent out to Feejee for that purpose. At Malolo, one of the smaller islands, Lieut. Joseph A. Underwood and Midshipman Wilkes Henry of the U. S. exploring expedition were murdered, July 24, 1840. The last affair of this sort took place in Oct. 1858. The marines and crew of the U. S. sloop of war Vandalia burned down a village and killed 14 and wounded 16 of the inhabitants of the island of Waya, in punishment for the murder and mastication of a New Yorker and two companions. A Feejeean is always armed, and war is his normal condition. The mountain fastnesses are well fortified by strong palisades and stone breastworks, pierced with loopholes. The arms chiefly used are clubs, spears, battle-axes, the bow, the sling, and the musket. A peculiar weapon is the missile club, which is worn stuck in the girdle, sometimes in pairs. It is a short stick, with a knob at one end, is hurled with great precision, and is a favorite weapon with assassins. The sick and aged are neglected, or if they become troublesome are buried alive or strangled. The relatives hold a wake over the intended victim while living and anointed for the sepulchre, and go into mourning after the entombment. The signs of mourning are the cropping of the hair and the joints of the small toe or little finger. Another remarkable custom is the *lolokv* or strangling of the wives and next friends of the deceased. Abortion is practised to a great extent by medicated waters or mechanical means. Boys are circumcised on attaining puberty.—Feejee has no one mythology common to all the islands. The native religions are local; each island has its own gods, traditions, and superstitions. All the systems belong to the lowest types of polytheism, and all are impregnated with the filth and savageness which characterize the actual existence of the people. Some features the mythologies have in common; they retain the distinction between *dii minores* and *dii majores*, between gods and demigods. The latter class is made up chiefly of deceased chiefs and respected ancestors. Monsters and other objects of wonder are admissible to this class. Most of the gods are supposed to have jurisdiction only over the tribes, islands, or districts where they are worshipped. Each trade has its tutelary deities. The Feejeeans have no idols, but reverence certain stones as shrines of the god, and hold certain birds and fishes as sacred. Each chief has his *ambati*, or priest, who acts in concert with him, and helps him to govern his clansmen. The temple (*mbure*) is used for all public purposes, and is the only public building. There are priestesses, but few of sufficient importance to have a temple. The portion of food devoted to the god is eaten by the priest and old men. The priests are consulted as oracles. The responses are given after convulsions, supposed to be caused by the presence of the god. There are various modes of divination, all of the most childish character, such as by biting a leaf or pouring water down the arm. They have a strong belief in all sorts of apparitions, witches, ghosts, wizards, and the evil eye. They believe in a sort of fairies who dance on the hills by moonlight and sing songs. The future world in their opinion is much the same as the present. In a large number of the islands, a particular town in Vanua Levu is thought to be the entrance to the spirit world. The houses in this town are built with their doors opposite to each other, so that the shade may pass through without interruption. The inhabitants speak in low tones,

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and if at a little distance communicate their thoughts by signs. The making of charms and amulets is a favorite occupation. Sneezing is ominous, and varies in its luck, according as it proceeds from the right or left nostril.—The first Christians resident in Feejee were a few Tongan emigrants and traders who had been converted in the Friendly islands. The horrible condition of Feejee moved the hearts of the British Wesleyan missionaries in Tonga in 1834, and two of their number were appointed to open a mission there. These two pioneers were the Rev. William Cross and David Cargill. They reached Lakemba, an island of the windward group, Oct. 12, 1835. They came furnished with letters of recommendation from King George of Tonga to the king of Lakemba, who received them kindly. One great advantage that the missionaries enjoyed arose from the fact that the Tongan tongue is well understood at Lakemba. The first part of St. Matthew's Gospel was translated into the Lakemba dialect and forwarded to Tonga to be printed, and a grammar and dictionary were commenced. The earliest converts in Lakemba were Tongan immigrants, who became class leaders and exhorters. In June, 1836, Christianity, or the *lotu* as it was called, was already of sufficient influence to prevent the massacre and eating of the crew of the Active, shipwrecked near Lakemba. Mr. Cross left Lakemba and opened the mission at Rewa, Jan. 8, 1838. In Dec. 1838, three more missionaries direct from England landed at Lakemba, and brought with them a printing press, type, and binding material. The first part of the "Conference Catechism" was printed at Lakemba in the native tongue in Feb. 1839, and St. Mark's Gospel not long after. Two more missionaries soon arrived, and it was determined to remove the printing press to Rewa, which was done in 1839. The influence of the missionaries was seen wherever they penetrated, in the cessation of cannibalism, war, and murder, and various other pagan practices. One custom lingered longer than others, that of polygamy. Many a man of rank who had changed his practices in every other respect refused to break up his domestic establishment and dismiss all his wives but one. In such cases the missionaries always refused the full privilege of church membership, however powerful the chief. At the same time they taught their converts to be obedient subjects in every thing except in following their chief to wanton and aggressive wars. As the Christians were more industrious and skilful than the pagans, the chiefs found their tribute increased, and this predisposed many of them to tolerate the presence of the missionaries and the spread of the *lotu*. Yet the persecution of the missionaries, native teachers, and converts was great. The converts found their houses and property destroyed by midnight attacks, and were often compelled to migrate in a body to seek the protection of a Christian or even a tolerant pagan chief. None of the missionaries ever fell victims to pagan wrath, though often in imminent peril, but several native teachers were sacrificed, and the mission premises were fired on one occasion. About 1843 the French Catholic missionaries commenced their operations in Feejee. The relations existing between them and their Protestant brethren are not so fraternal as could be desired. They are more tolerant of some of the native practices, such as dancing, than the Protestants. In 1857 there were 54,281 attendants upon the religious services conducted by the Wesleyan missionaries. In many of the circuits the Christians support their own pastors, who are natives either of Feejee or Tonga. By the latest accounts there are 8 Protestant missionaries in Feejee, and no fewer than 200 native teachers in the same islands and in Rotuma, an island a considerable distance to the north of Feejee. For the numerous children, chiefly half caste, of the white residents at Levuka, Ovolau, a school has been established by the mission society, where instruction is given in the native and English tongues.—The Feejee language has at least 15 dialects. The missionaries are acquainted with 7 of these, and books have been printed in 4 of them. In 1844 it was determined to make the dialect spoken at Mbau the standard dialect of Feejee, and with insignificant exceptions all the works since printed have been written in this dialect. The chief peculiarity of the Feejee as distinguished from the other Polynesian languages is the use of the combinations *mb* and *ng*. The missionaries in their vocabularies have used the Italian and not the English sounds of the vowels. The New Testament was completed in the Mbau dialect chiefly by the Rev. John Hunt. The British and foreign Bible society gave great pecuniary and other assistance to this work, and issued an improved edition of the same. The Rev. David Hazlewood published a grammar and a Feejeean-English and English-Feejeean dictionary in 1850. The same indefatigable missionary completed in a few years the translation of the Old Testament from the Hebrew. Mr. Calvert, for 17 years missionary in Feejee, is now (1859) in London, supported by the British and foreign Bible society, to assist in revising Mr. Hazlewood's translation of the Old Testament in its progress through the press.—See "Life in Feejee, or Five Years among the Cannibals" (Boston, 1851); Laury, "First and Second Missionary Visits to the Friendly and Feejee Islands" (London); Erskine, "Journal of a Cruise among the Islands of the Western Pacific" (London, 1853); Robert Young, "Journal of a Deputation to the Southern World" (London, 1855); Wilkes, "U. S. Exploring Expedition around the World" (New York, 1856); and Williams and Calvert, "Fiji and the Fijians" (2 vols., London, 1858.)

FEIJO, Diego Antonio, a Brazilian statesman, and from 1834 to 1838 regent of Brazil, born in Itu, in the province of San Paulo, in 1780. He distinguished himself in early life by his eloquence as a pulpit orator. When the relation of Brazil to Portugal began to agitate

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the public mind, he devoted himself to politics, and after having been sent as deputy of his province to the cortes convened in Portugal, he became in 1821 and ever afterward remained an uncompromising champion of the national independence of Brazil. In 1822, when the Brazilian declaration of independence became known at Lisbon, Feijo was compelled to flee. After spending a short time in England in studying the political institutions of that country, he returned to his native country, and published a pamphlet in which he advocated the establishment of a South American republic after the model of the United States. He was soon chosen a member of the legislative assembly, and he exerted his influence in displacing Don Pedro from power. After the revolution of April, 1831, he held almost supreme power, although his office was only that of minister of justice. He dissolved the revolutionary army, organized a national guard, made stringent laws against political offenders, and subdued the unruly spirit in parliament and in the country at large. His official duties, however, changed his political convictions, and from a sturdy advocate of republicanism he became a conscientious champion of constitutional monarchy. He relinquished his office in 1832, and in the following year entered the Brazilian senate as a member for Rio de Janeiro; and for some time he edited a political journal in the province of San Paulo. In Aug. 1834, he was appointed bishop of Marianna, and in the same year was nominated for 4 years regent of Brazil. He entered upon his administration under the most auspicious circumstances, and enlisted the sympathies of the people by his apparent solicitude for the preservation of civil and religious liberty. Soon, however, he was suspected of anti-liberal tendencies. The suspicion received confirmation by his attempt in 1836 to withhold the privilege of trial by jury for offences of the press. The opposition against him finally assumed such formidable proportions that he was compelled to resign his office after having appointed a new prime minister in the person of Pedro d'Aranjo Lima, who succeeded him as regent on Sept. 12, 1838. Since then Feijo has taken no part in the public affairs of his country, excepting in 1842, when he appeared as the leader of a revolutionary attempt at San Paulo.

FELDSPAR (Germ. *Feld*, field, and *Spath*, spar, in the derivative feldspathic), an important mineral species, which includes a large number of varieties; also the name given by Dana to one of the sections of the anhydrous silicates. The mineral as commonly seen is the light-colored ingredient of granite, distinguished by its pearly lustre, and a hardness little inferior to that of the quartz with which it is intermingled. On the scale its hardness is 6. Its specific gravity is 2.4–2.6. It crystallizes in oblique rhomboidal prisms, which are sometimes found, as at the quarries at Middletown and Haddam, Conn., a foot long and 6 or 8 inches thick. In composition the common feldspar is a silicate of alumina and potash, represented by the formula $KO, SiO_2, Al_2O_3, 3\,Si_2O_2$, and consisting of silica 64.76, alumina 18.37, potash 16.87 per cent. Lime and oxide of iron are commonly present in small quantities, and a portion of the potash is often replaced with soda. In the variety called albite soda is substituted for the potash, and NaO takes the place of KO in the above formula. The composition is then silica 68.7, alumina 19.5, and soda 11.8 per cent. The two varieties are sometimes seen together as constituents of granite, as in that of which Pompey's pillar is made. Labradorite is a beautiful variety of feldspar of pearly lustre, and often exhibiting a play of blue, green, yellow, and red colors. In this lime and soda together replace the potash, the former commonly being present in the proportion of 10 to 12 per cent., and the latter 4 to 5; oxide of iron also about 1 per cent. Feldspar may be fused by the blowpipe on its edges into a white enamel. In its purer forms it is a valuable material for the construction of mineral teeth, being ground to powder, made into a paste with water, and baked, the substances used for coloring being first introduced. Labradorite is sometimes so beautiful from its chatoyant reflections, that it is employed in jewelry. By the decomposition of feldspathic rocks, the fine clays (as kaolin) are obtained, which are used in the manufacture of porcelain. The soil derived from this source is enriched by the potash or soda set free. The mineral is one of the ingredients of the various granitic rocks, and of trap, basalt, porphyry, and many others. In the last named it is in crystals disseminated through a feldspathic base. The appearance of scattered crystals of feldspar in granite gives it the name of porphyritic.

FELLAHS, the people in modern Egypt that cultivate the soil. Of the various races which exist in Egypt the Fellahs are the most ancient, and are probably the descendants of the old Egyptians. Although numerous invasions have introduced foreign elements among them, yet the original race, devoted to agricultural labor, has always at last absorbed the invading race, and still presents a physiognomy resembling that which is found upon ancient Egyptian sculptures. A patient and laborious population, they have held for ages the soil which the Nile fertilizes. The Fellahs are generally of large stature, with broad chests, muscular limbs, and black and piercing eyes. The conformation of the brain indicates an intelligent race, the facial angle being usually almost a right angle, though within the Delta the Arab type of countenance predominates. Those of the Delta, too, have an almost white complexion, while the others are copper-colored. The antique Egyptian type reappears most strikingly in the women, who, though slender and graceful, are remarkably strong. The dress of the Fellahs indicates misery and privation, being rarely more than a shirt, leaving bare the arms, legs, and breast. Their ordinary nourishment is

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coarse bread, marshy water, and onions, to which they are sometimes able to add cheese, dates, beans, or rice. They live in huts about 4 feet high, the only furniture of which is a mat on which to sleep, a water jug, and a few kitchen utensils. They remain attached to the rudest agricultural methods, and use almost the same implements as their remote ancestors; yet the fruitfulness of the soil, which sometimes yields 7 crops annually, and the industry of the Fellahs, compensate for their lack of skill. Mehemet Ali failed in his efforts to introduce among them the implements of modern invention. They are able to endure the greatest fatigue, and to work through the whole day in a burning climate with but very little food, accompanying their labors with pious hymns; yet they are naturally indolent, and when subsistence has been secured, they cease work. The women share the heaviest labors of the men.

FELLATAHS. See Foolahs.

FELLENBERG, Philipp Emanuel von, a Swiss educator and philanthropist, founder of the institutions at Hofwyl, born in Bern, June 27, 1771, died there, Nov. 21, 1844. His father was a member of the government and a friend of Pestalozzi. His mother was a descendant of the Dutch admiral Van Tromp, and was remarkable for her noble character and her enthusiasm for liberty. This she imparted to her son, who after devoting several years to study at Colmar and Tübingen, travelled extensively with a view of familiarizing himself with the condition of the working and suffering classes. He was at Paris immediately after the fall of Robespierre, and there his early convictions became strengthened, that improved systems of education alone can protect society against revolutions. On his return to Switzerland, after taking part against the French, he was exiled when they had succeeded in taking Bern. He fled to Germany, and sent several friends to the United States, whither he had some intention of repairing. However, he was soon enabled to return to Switzerland, and was employed by the government in a mission to Paris, and in high military and political functions at home. He succeeded in quelling the insurrection of the peasantry in the Oberland, but as the government failed to fulfil the promises by which he had pacified them, he withdrew from public affairs. He now devoted himself entirely to his favorite educational projects. After officiating for some time as a member of the board of education in Bern, he became convinced that nothing could be accomplished by the government. He resolved therefore to devote his large fortune to the purchase of the estate of Hofwyl near Bern, and to the establishment of model institutions in accordance with the views of Pestalozzi. The principle of this system was to produce a harmonious development of all the various faculties of the pupil, so as to make him not only a learned, but also a good, wise, and religious man. Great attention was bestowed upon the development of the body by gymnastics and games, by cold bathing, and by other healthful exercises. Fellenberg's aim was to elevate all classes by opening an institution alike to the poor and the rich, and by making agriculture not only the basis of his instruction, but also by elevating that profession to the dignity of a science. Apart from the agricultural school, he founded an establishment for the manufacture of improved agricultural implements. At the same time he laid the foundation of a scientific institution, which he desired to conduct in conjunction with Pestalozzi; but Fellenberg's Swiss system of economy was little in harmony with the generous but imprudent habits of Pestalozzi, who withdrew to the castle of Yverdun. Fellenberg proceeded with his task, and after having organized his scientific school, for which the first building was erected in 1807 (the number of professors increasing in a few years to 20, and the pupils to 80), the agricultural institution was opened in 1808, while he established in the same year a normal school. Although this became popular among the teachers of Switzerland, it soon gave umbrage to the government, and was eventually incorporated with the agricultural institution. This grew in importance as its advantages became known abroad. The emperor Alexander of Russia sent Capo d'Istria on a mission to examine the school, and was so pleased with the account which he received of it, that he conferred upon Fellenberg the order of St. Vladimir, and confided to him the education of 7 Russian youths, for whose use a Greek chapel was opened near the school. The great increase of pupils called for a constant enlargement of the buildings, which comprised altogether 7 distinct schools, to which a primary school was added in 1830, and still another school for children at a subsequent period. By these schools, and by his writings on the subject of agriculture and education, Fellenberg exerted a remarkable influence in Europe; and although the institutions which he founded were dissolved after his death, after having been conducted for several years by one of his sons, kindred institutions have sprung up in Switzerland and Germany, and the celebrated pauper colony of the Netherlands at Frederic's-oord, province of Drenthe, was founded in 1818 by a pupil of Hofwyl. Fellenberg was assisted in his benevolent labors by his wife, and by the greater number of their 9 children. See Hamm, *Fellenberg's Leben und Wirken* (Bern, 1845).

FELLER, François Xavier de, a Belgian priest and author, born in Brussels, Aug. 18, 1735, died in Ratisbon, May 21, 1802. He was educated at the Jesuits' colleges at Luxembourg and Rheims, and after becoming a member of their order, he was employed as professor at Luxembourg and Liége. He subsequently applied himself in the former city to the study of theology until 1764, when the suppression of the Jesuits in France brought so many of them to the Netherlands, that, to make room for them, many young Belgian priests were sent to

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other countries to continue their studies. Feller went to Tyrnau, in Hungary, where the Jesuits had an establishment. After having passed some time there, he travelled extensively in Hungary, Austria, Bohemia, Poland, and Italy, returned to the Netherlands in 1770, and was preacher in the college of Liége, when the order of Jesuits was suppressed in Belgium (1773). Henceforward he devoted himself to literary pursuits, but was compelled to leave Belgium after the invasion of that country by France (1794). He spent 2 years at Paderborn, Westphalia, and in 1797 retired to Ratisbon. He left a number of writings, chiefly on religious subjects. In his *Observations philosophiques sur le système de Newton* (3d and enlarged ed., Liége, 1788), he denies the existence of a plurality of worlds, and endeavors to prove that the movement of the earth, although so universally admitted, may still be open to doubt. This work involved him in a controversy with the astronomer Lalande. A 4th and enlarged edition of his *Catéchisme philosophique* appeared in Liége in 1805, and an edition printed from a copy which had been revised and annotated by Feller, in Lyons, in 1819. It was translated into German, Italian, and English. Madame de Genlis also prepared an abbreviated edition of it entitled *Catéchisme critique et moral*. Feller's principal work is his *Biographie universelle, ou dictionnaire historique*, which passed through many editions, and after his death was revised and continued under the direction of M. Charles Weiss and the abbé Busson, and brought down to 1848 (9 vols., Paris, 1847–'56). This biographical work is based upon that of Chaudon, but is more zealous and emphatic than that in the assertion of Roman Catholic views.

FELLER, Henriette, a Swiss Protestant lady of Lausanne, who in 1835, after the death of her husband and of her only child, went to Canada, where she became celebrated by her educational and missionary labors. Although frequently interrupted in her benevolent enterprises by opposition and by the loss of the ample means she brought with her, her persevering efforts produced good results upon the education of the poor and the young of the French population of Montreal and St. John's. From the latter place she was expelled at the time of the first rebellion in Lower Canada, when she fled with 60 of her pupils and friends to Champlain, N. Y. After having returned to Canada in 1836, she removed to Grand Ligne, about 20 m. from Montreal. Here she opened her school at first in an open barn. By the assistance of the Rev. Mr. Gilman, a Baptist minister of Montreal, who collected funds for the establishment of a mission house, she was enabled to enlarge her institution, which contained in 1855 over 300 pupils.

FELLOWES, Robert, an English author, born in Norfolk in 1770, died in 1847. He was graduated at St. Mary's hall, Oxford, and in 1795 took holy orders. His speculations on theological subjects gradually led him, however, to reject the doctrines of the established church, and to adopt the opinions which are given at length in his "Religion of the Universe," published in London in 1836. This work was preceded by a "Picture of Christian Philosophy" (8vo., London, 1800); "Religion without Cant" (8vo., 1801); "The Guide to Immortality" (3 vols. 8vo., 1804); "A Manual of Piety, adapted to the Wants and calculated for the Improvement of all Sects of Christians" (8vo., 1807); "A Body of Theology, principally practical, in a Series of Lectures" (2 vols. 8vo., 1807), &c. The general merits of these works are highly commended by Dr. Parr in his "Spital Sermon." Mr. Fellowes was an intimate friend of Dr. Parr and Baron Masères, the latter of whom left him the greater part of his large fortune, to be dispensed in literary and benevolent enterprises. He was one of the earliest advocates of the establishment of the university of London, of which he was a frequent and liberal benefactor.

FELLOWS, Sir Charles, an English traveller, born in Nottingham in 1799. In 1838 he made an extensive tour in Asia Minor, in the course of which he visited the valley of the river Xanthus and other parts of ancient Lycia previously unexplored by modern travellers. On his return to England he published a "Journal written during an Excursion in Asia Minor" (8vo., London, 1839), in which he gave descriptions of the superb architectural and sculptural remains of the cities of Xanthus and Tlos. The interest excited by the work induced the government to apply to the Porte for a firman, authorizing the removal of specimens of the ancient works of art described by Mr. Fellows. The latter, anticipating that permission would at once be granted, offered his services to the British museum to superintend the selection and removal of the marbles, and departed on a second tour through Lycia, in the course of which he discovered 13 other ruined cities. Having learned that the Porte declined to grant the firman, he returned to England, and published "An Account of Discoveries in Lycia, being a Journal kept during a Second Excursion in Asia Minor" (8vo., London, 1841). The government were stimulated to make another attempt to procure the desired firman, in which they were successful, and in Oct. 1841, Mr. Fellows sailed for Lycia as the agent of the British museum in superintending the removal of the works of art. After some little delay the expedition succeeded in transporting to England a number of cases of sculptures, which are now deposited in the "Lycian Saloon" of the British museum. A second expedition, also under the direction of Mr. Fellows, brought a number of additional marbles to England in 1844. For these services he received in 1845 the honor of knighthood. His remaining publications are: "Account of the Xanthian Marbles in the British Museum" (8vo., 1843), a pamphlet written to correct some misstatements; "Account of the Trophy Monument at Xanthus" (8vo., 1848); and "Coins of

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Ancient Lycia" (8vo., 1855). In 1852 appeared an edition of his two journals in one volume, under the title of "Travels and Researches in Asia Minor, particularly in the Province of Lycia."

FELO DE SE. A man who commits felony against or upon himself, is a *felo de se;* and as felony is, in common law language, any capital offence, and murder is the only capital offence which a man can commit against himself, a *felo de se* is a self-murderer, or one who kills himself with malice aforethought. Indeed, the legal definition of a felony *de se* (or snicide) is said to include the doing of any unlawful and malicious act, although aimed primarily against another, whereby death ensues to the guilty person. In England, this crime was punished not only with forfeiture of goods and chattels, like other felonies, but, to mark the detestation of the law, and to deter others from a similar crime, the body was treated ignominiously, and buried in the open highway with a stake thrust through it. This very ancient rule fell into general if not entire disuse in England many years ago, but it was not repealed until the statute 4 George IV., ch. 51; and even then, to manifest the horror of the law at the act of suicide, it was ordered that the body (which might be placed in church yards or other consecrated grounds) should be buried at night, and without the performance of religious rites. (See Chitty's edition of Blackstone's "Commentaries," vol. iv. p. 190.) Suicide does not seem ever to have been made punishable as a crime by any statutory provisions of the United States; nor are we aware that the barbarous usages of England in relation to the burial of the corpse were ever practised here.

FELONY. The origin and the exact meaning of this common law term are both uncertain. There is about eqnally good authority for deriving it from the Saxon words *feh*, fee, and *lon*, price or pay, when its primary sense would be forfeitnre or loss of fee; or from a single word *felen*, to fall or fail, when its meaning might be the falling of the guilty party into crime, or the falling of his land into the hands of his lord by forfeiture. It seems quite certain that in England, from the earliest times, felony was always attended by absolute forfeitnre of land or of goods, or of both; and the definition of Blackstone (4 Bl. Com. 95) is, in accordance with this principle: "An offence which occasions a total forfeiture of lands or goods, or both, at the common law, and to which capital or other punishment may be superadded, according to the degree of guilt." But we understand Blackstone to mean, generally, by felony, all capital crimes below treason (p. 98); and Coke says (3 Inst. 15) that treason itself was anciently included within the meaning of felony. In those distant ages, a felon was to be punished: 1, by loss of life; 2, by loss of land; 3, by loss of goods; 4, by loss of blood, or attainder, under which he could have no heir, and none could ever claim through him. In more recent times, felony meant in practice any crime punishable with death; and therefore when a statnte declared any offence to be felony, it became at once punishable with death; and *vice versa*, a crime which is made punishable with death, becomes thereby a felony. Even in early times, felony was sometimes defined as any capital crime; although it is said that before the reign of Henry I. felonies were punished only by pecuniary mulct or fine, and that sovereign having ordered those guilty of felony to be hanged, about 1108, this has since been the law of England. (Tomlin's "Law Dictionary," word "Felony.") It cannot be doubted, however, that at common law the forfeiture incurred by the crime was the essence and the test of felony. In the United States there is little or no forfeiture for crime (see FORFEITURE); and in England capital offences are far less numerous than formerly. It may be said that in the United States the word, so far as it has any definite meaning, signifies a crime punishable with death or imprisonment. But in truth it has so little meaning which is capable of definition, and therefore so little which is capable of use, that it might be well to abandon the word altogether in legal phraseology, whether that of process or of statute.

FELT, a fabric of wool or fur, separate or mixed, manufactured by matting the fibres together without spinning or weaving. The fur of the beaver, hare, rabbit, and seal, camel's and goat's hair, and the wool of the sheep, are well adapted for this process. Felt is an ancient manufacture, supposed by Pliny to have been produced before woven cloth. Some, however, ascribe the invention of it to St. Clement, who, they say, found the carded wool, placed in his sandals to protect his feet on a pilgrimage, felted into cloth by the moisture and rubbing. It is also supposed that the material is the same as the *lana coacta*, used in ancient times for the cloaks of soldiers, and by the Lacedæmonians for hats. Early in the present century a piece of ancient felt was discovered with some other stuffs in a tomb at St. Germain des Prés, and a paper relating to them was presented by Desmarest in 1806 to the academy of sciences, in which he refers to the above statement of Pliny.—The production of a fabric from the loose fibres results from the tendency these have from their barbed structure to work together when rubbed, each fibre moving forward in the direction of its larger end without a possibility of progressing in the other direction. This peculiar structure of the animal fibre, so different from that of the smooth vegetable fibres, is readily perceived on drawing a filament of wool through the fingers, holding it first by one end and then by the other. Examined through a powerful microscope, the short fibre exhibits the appearance of a continuous vegetable growth with numerous sprouts, all pointing toward the smaller end. In a filament of merino wool as many as 2,400 of these projections or teeth have been found in a single inch; and in one of Saxon wool of superior felting quality there were 2,700 serrations in the same space. Southdown wool, which is not so much

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esteemed for this use, contained only 2,080 serrations in one inch; and Leicester wool, which is not at all adapted for felting, only 1,860. The short curly fibres of wool, freed from grease and brought together, intertwine at once very closely and form a compact mat. By rubbing this with the hands, and moistening it with some soapy liquid, the matter is made more dense according to the pressure with which it is rubbed. At last the fibres can go no further without danger of fracture, and the fabric becomes hard and stiff. It may, however, be made thicker to any desired extent by adding more fibres and rubbing these in by separate layers.—Until within a few years felt has been chiefly employed for hats, either for the whole hat, as in those made of wool and of fur, or for the body alone, which is afterward stiffened and covered with silk. This, which is now but a branch of the felt manufacture, will be treated in the article HAT. The application of the material to various uses under modern improvements, mostly of American introduction, has given a new importance to the fabric, and the present article will treat especially of the manufacture of felt for articles of clothing and heavy cloths. By the old process for obtaining a felted web, the fur or wool was first assorted; to effect which various methods were employed. One of these was to blow the mixtures through a long wooden trunk, in which each sort, according to its greater or less gravity, falls at a less or greater distance within the trunk. Thus a selection could be made and the different qualities be mixed in desired proportions for the required fabric. The mixture was then placed upon a table and whipped with a bowstring, the vibratory motions of which threw the particles about, separating the knotty lumps and causing the lighter portions to fall, overspreading the table with the fibres lying in every direction. Being then covered with a piece of dampened blanket stuff and rubbed with the hand applied upon this, the fibres readily interlaced and formed a mat. This process has been almost entirely superseded in the United States by several ingenious machines for forming a mat, some of which, omitted here, will be noticed in the article HAT. The English invented an improved method, which is called the pneumatic process. Two air-tight chambers are built side by side, a portion of the partition between them being of wire gauze, which may be covered air-tight. In one of the rooms the woolly fibres are tossed by a sort of winnowing wheel, so as to be dispersed throughout the air. The air from the adjoining room being exhausted, and the communication through the wire gauze opened, the flocculent particles are carried with the rush of air against the gauze, and intertwining with each other as they crowd through the interstices, they are instantaneously matted together and form a web, which may afterward be made as dense as required. —In all the felted fabrics prepared by the old method, in which strength is an essential element, serious defects were experienced in the unevenness of the texture, a liability to tear more easily in one direction than another, and in the tendency of the material to lose its shape by wear or by being wet. From these causes the goods had a poor reputation, and the common impression still is that they are far inferior to other woollen fabrics. To improve the quality of the article experiments were directed to careful selection of the materials employed, and it was found that every particle of cotton and all strange fibres must be scrupulously excluded from the wool; and then, to secure equal strength in every direction, the fibres must be so laid and intertwined as to cross each other with much regularity. To accomplish this has been the great difficulty. One of the first steps was to form gossamer-like sheets and apply these one upon another till they attained the required thickness; but these sheets, lying in the same direction, or not crossing each other regularly, lacked strength. Methods were then contrived by which each successive film, as it came from the doffer of the carding machine, was laid zigzag upon that before deposited upon the apron; and again, by a swinging or vibratory motion of the web, it was laid in lines crossing those of the web beneath at small angles. These improvements have been carried to their greatest perfection in the machines of the "New York Seamless Clothing Manufacturing Company." In 1848 Mr. S. M. Perkins of New York conceived the idea of uniting the edges of felted cloth by felting them together; and in 1851 he obtained a patent for the process. This was afterward improved by Messrs. L. W. Badger and D. W. Gitchell, to whom several patents were issued, the last in 1857, covering the whole ground of their peculiar operations. They commenced the manufacture in Winchendon, Mass., in 1855, and after carrying it on there 2 years removed to Matteawan, near the Hudson river, where the facilities admit of greater extension of the business. In their operations the wool, chiefly obtained from New York, Vermont, and Ohio, is assorted, cleaned, picked, and dyed by the ordinary methods; and being then passed through the common carding machine, it is delivered from its apron in the form of a web, usually 8 feet wide, and as thin as gossamer. This is passed between 2 horizontal rollers, and is then taken up by the apron of another machine called the "former," upon which it undergoes the operation called by the inventors "weaving in the wool," by which a bat is produced of any desired length, width, and thickness. The endless apron of the "former" runs at right angles to and under the first one. It has a length of 60 feet, but by means of 4 turns is made to occupy only 15 feet. Beside its forward motion, the carriage it is upon moves laterally up to the carding machine and back again, the distance being the width of the bat. In consequence of these two motions the web is laid diagonally across the lower apron in zigzag lines, and the motions are so adjusted that with each turn the angle made is a right angle.

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The apron goes round, receiving these layers along its whole length, and the circuit being completed the next layers cross those first deposited; and the third set leave no space over the area of the bat uncovered. As many as 30 films are thus piled together, binding each other and making a strong fabric, and the number may be increased to give any desired thickness. In the operation the films are partially matted together, so that the bat coheres as one piece; indeed, it could not be carded again without repicking. It is then removed to the felting machine and partially hardened. In this machine the rubbing is effected by a slight forward and backward motion of a very heavy iron plate laid upon the bat, and steam is introduced to facilitate the operation. The bat thus produced is now ready for the very ingenious operations of the same inventors by which it is converted into articles of seamless clothing. It is first cut by skilful tailors in patterns half as large again as those used for the same garments in other materials. The edges that are to be joined are then bevelled by a sort of combing process performed by hand, and being then laid together and cotton cloth being introduced into the openings for the pockets and the sleeves, in order to prevent the two surfaces coming in contact and uniting, the articles are again rubbed for a short time under the iron plate, when the pieces are found to be thoroughly joined with no trace of a seam. The garments are then fulled, as ordinarily practised with woollen goods, and by this process they are reduced to the required size. The drying of felt cloth is effected as with ordinary woven cloth by exposure on tenter bars; but the seamless garments are dried upon hollow forms or models of sheet copper made in their exact shape, and heated by steam introduced within. In this way are manufactured a great variety of articles of wearing apparel, as coats, vests, leggins, gaiters, slippers, mittens, caps, &c., of remarkable strength and durability. The fabric is a very different article from that commonly known as felt. It is altogether as elastic and strong in one direction as another. It is soft and agreeable to wear, is nearly waterproof, and cannot become misshapen by being wet. Put to severe tests in our public ships, it has received the highest testimonials from Capt. Hudson, the commander of the Niagara, and other officers, as better adapted for withstanding hard usage and resisting the pelting of rain and sleet than any other material. It may be made of thickness adapted to any degree of cold, and hence is equally useful in protecting against the rigor of an arctic winter or the rains of the tropics. These qualities are rapidly bringing it into use in our naval service, and must soon establish a new reputation for the article felt. A singular feature in the new method of manufacture is the rapidity with which the crude material may be made into wearing apparel. The inventors assert that the wool growing upon a sheep's back may, by omitting the process of dyeing, be converted within 24 hours into a finished garment ready for wear.—Felted cloth is also produced by a somewhat similar method to that described, at Norwalk, Conn., by the "Union Manufacturing Company." Layers of delicate webs are piled across each other to form a bat upon a smooth metallic bed plate, and the pile is then subjected to the action of a large metallic beater, weighing 2 tons. The whole is thus consolidated into a compact felt. By using alternate dark and light webs, stripes and plaids are formed in the fabrics. Carpets are made of felt in Lawrence, Mass., and the colors are printed upon them as in calico printing. The heavy cloths serve a useful purpose as a covering to steam cylinders and boilers, and they have also been used to cover the roofs of houses, being rendered for this purpose water-proof by proper applications. The cloths serve also as linings of water-tight compartments in ships.—Further details on this subject will be given in the articles Norwalk, Conn., and Wells, Henry A.

FELTHAM, Owen, an English author of the 17th century, died about 1680. No event of his life is known except that he resided for many years in the house of the earl of Thomond. He wrote "Resolves, Divine, Political, and Moral" (2d ed., 1628; 3d, and 1st complete ed., 1628; 10th ed., 1677), which has been highly admired for its exuberance of wit and fancy, fervent piety, and occasional subtlety of thought. Hallam, however, criticizes him as a labored, artificial, and shallow writer. Feltham is the author also of a few minor pieces in prose and verse. The latest edition of his "Resolves" appeared in London in 1839.

FELTON, Cornelius Conway, an American scholar and writer, born at West Newbury, now Newbury, Mass., Nov. 6, 1807. He was graduated at Harvard college in 1827. While in college he was distinguished for his literary tastes, and the wide range of his studies. In his senior years, he was one of the conductors of the "Harvard Register," a students' periodical. After leaving college, he was engaged for two years, in conjunction with two of his classmates, in the charge of the Livingston high school in Geneseo, N. Y. In 1829 he was appointed Latin tutor in Harvard college, Greek tutor in the following year, and college professor of Greek in 1832. In 1834 he was appointed Eliot professor of Greek literature, the duties of which place he has ever since continued to discharge. In 1833 he published an edition of Homer, with English notes and Flaxman's illustrations; which has since passed through several editions, with revisions and emendations. In 1840, a translation by him of Menzel's work on "German Literature," in 3 volumes, was published among Ripley's "Specimens of Foreign Literature." In the same year he gave to the public a "Greek Reader," containing selections in prose and verse from Greek authors, with English notes, and a vocabulary; this has since been frequently reprinted. In 1841 he published an edition of the "Clouds" of Aristophanes, with an introduction and notes; since revised

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and republished in England. In 1843 he aided Prof. Sears and Prof. Edwards in the preparation of a work on classical studies, containing essays on classical subjects, mostly translated from the German. He assisted his friend Prof. Longfellow in the preparation of the "Poets and Poetry of Europe," which appeared in 1845. In 1847 editions of the *Panegyricus* of Isocrates, and of the *Agamemnon* of Æschylus, with introductions and English notes, were published by him; a 2d edition of the former appeared in 1854, and of the latter in 1859. In 1849 he translated from the French the work of Prof. Guyot on physical geography, called "The Earth and Man;" and in the same year he published an edition of the "Birds" of Aristophanes, with an introduction and English notes, which was republished in England. In 1852 he edited a selection from the writings of Prof. Popkin, his predecessor in the Eliot professorship, with an introductory biographical notice. In the same year he published a volume of selections from the Greek historians, arranged in the order of events. The period from April, 1853, to May, 1854, was spent by him in a European tour, in the course of which he visited Great Britain, France, Germany, Switzerland, Italy, and Greece; giving about 5 months to the last named country, visiting its most interesting localities, and carefully studying its architectural remains. In 1855 he revised for publication in the United States Smith's "History of Greece," adding a preface, notes, and a continuation from the Roman conquest to the present time. In the same year, an edition of Lord Carlisle's "Diary in Turkish and Greek Waters" was prepared by him for the American press, with notes, illustrations, and a preface. In 1856 a selection by him from modern Greek writers in prose and verse was published. Beside the above, Prof. Felton has compiled an elementary work on Greek and Roman metres, is the author of a life of Gen. Eaton in Sparks's "American Biography," of various occasional addresses, and of numerous contributions to the "North American Review," "Christian Examiner," and other periodical publications. A series of vigorous articles on spiritualism, which appeared in the "Boston Courier" in 1857–'8 is understood to have proceeded from his pen. He has delivered 3 courses of lectures before the Lowell institute in Boston, on subjects connected with the history and literature of Greece. The articles on Agassiz, Athens, Attica, Demosthenes, and Euripides in this Cyclopædia are by him. These literary labors have never interfered with the faithful discharge of his duties as an officer of instruction and discipline in the college; to which has been added during the last 3 years a share in the instruction of a young ladies' school, under the charge of Prof. Agassiz in Cambridge. Prof. Felton is a member of the Massachusetts board of education, and one of the regents of the Smithsonian institution. In the summer of 1858 he made a second visit to Europe, partly on account of his impaired health, and partly to complete some investigations into the language, topography, education, &c., of Greece.

FEME, the ancient Norman French form of the word *femme*, woman, which, being introduced into the common law at the time of the Norman conquest, has remained there ever since, although now superseded generally in England, and almost universally in the United States, by the appropriate English word. Thus for *baron* and *feme*, *feme covert*, and *feme sole*, we now say husband and wife, married woman, and single woman.

FENCING, the art of attack and defence with any weapon (not a projectile) in which address is employed; therefore the wielding of the battle axe, mace, and such arms as cut or break by sheer force, does not come under the head of fencing. The small sword, having a point but no edge, is the weapon which demands the highest degree of adroitness in its application for attack and defence; hence the word fencing is understood to allude especially to the management of this sort of sword, and when any other arm, such as broadsword, bayonet, or stick, is used, the kind of weapon is specified, though its use is always in accordance with the same principles. Fencing was cultivated by the ancients. The Roman gladiators instructed the soldiery of that epoch, but as their weapons differed so materially from those of the present day, and as they defended themselves by shields and armor, rather than by the skilful management of the weapons themselves, the study of their methods can be of little advantage to us. During the middle ages fencing was neglected, probably in consequence of the perfection and completeness of the suits of armor worn by the combatants, from which circumstance battle axes and other ponderous weapons were much adopted. When, however, metal casing fell into disuse, fencing came again into vogue; and as in those times all gentlemen wore swords, the advantage of being "cunning of fence" was palpable. The peculiar state of society existing in Italy in the 16th century made such knowledge more needed there than elsewhere; consequently the Italians became the most expert fencers of that epoch, and were the teachers of the art to other nations. The next country which found the art to be a necessity was Spain, whose people imported it from Italy. In Spain the art was improved, and the amendments were accepted in Italy. From Italy fencing was also imported into France, where the court and gentry favored it so much that it quickly took a fresh development, and a new school was established, comprising not merely additions to the knowledge already possessed, but working in many particulars a radical change. Though the principal object in studying the art of fencing is to enable men to wield arms with advantage, the schools are not attended exclusively by military men. Literati, artists, men of leisure, and many professional

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men following sedentary occupations, practise fencing as a recreation and an exercise, and indeed some of them attain the highest grade of perfection; for example, Alexandre Dumas handles with as much skill a foil as he does a pen. Regarded as a mere exercise, it is different from ordinary gymnastics. While it demands no violent straining of the muscles, and requires a total absence of rigidity of limb, it nevertheless develops in an extraordinary degree the whole *physique* of man; for it is evident by the ease and grace with which fencers execute movements of extreme velocity that they must have a great surplus of strength, otherwise such motions would be performed with awkwardness and manifest effort and difficulty. It also imparts to the fencer the most perfect delicacy of touch, with steadiness and lightness of hand, for which reason it should be practised by artists and by surgical operators.—The fundamental principle upon which is based the defence of the person by means of the small sword is a peculiar application of the power of the lever, whereby the fencer who parries an attack causes the point of his adversary's blade to deviate from the direct course, and throws it aside from his body through pressing or striking the feeble (part near the point) of his adversary's weapon by the *forte* (part near the handle) of his own. The surface of the front of the body is, in fencing language, divided by an imaginary line, horizontal, and just below the breast, separating the upper from the lower portion; the upper part is again subdivided by a perpendicular line, the right of which is termed the outside, the left the inside. There are (or rather there were) in the old school 8 parries, distinguished by the Italian numerals *primo*, *secondo*, *terzo*, *quarto*, &c., from which are taken the modern terms *prime*, *seconde*, *tierce*, *carte*, &c. The instrument adopted for exercise is called a foil; it has a handle similar to the small sword, which it is intended to represent; it has a guard of metal or leather between the handle and the blade, which blade is of pliant steel, having at the end a button in place of a point. The parries are made with the weapon itself; the upper part of the body to the right is defended by the parry termed *tierce*, the upper part to the left by that termed *carte*, and the lower line by *seconde*. Of the old parries these are the chief; indeed the others are nearly obsolete, or used only in certain exceptional cases. When the fencer is left-handed, the left of his person instead of the right is most exposed to his adversary, and the parries of carte and tierce are reversed. The fencer is expected to depend upon his sword hand for protection, rather than upon his agility of leg; nevertheless he must be quick and active on his legs to be able to advance, retreat, or lunge. The knees must therefore be somewhat bent when the fencer is on guard, that he may be light and springy in his movements. Thrusts are directed solely at the body; any hit on a limb would be accidental rather than intentional, and in a fencing school would not be accounted a hit. An attack or a *riposte* may be made by the mere extension of the arm, or accompanied by a lunge—that is, by advancing the body, stepping forward with the right foot without moving the left one. An engagement means the crossing of the blades. A *riposte* means the attack without pause by the fencer who has parried.—The early Italian and Spanish schools taught the management of the sword aided generally by the dagger or the mantlet; the shifting of the position of the fencer to the right or left was also called into requisition in avoiding an attack. But since the habit of wearing the dagger and mantlet has been abandoned, and the velocity of attack and riposte has become so great that the dagger and mantlet would be an encumbrance, and the shifting of the position would be fatal to him who relied upon it, the instruction in defence has been confined solely to the foil. The Italian foil is long, some 38 to 40 inches; the ancient were longer than the more modern; they are also much heavier and less pliant than the French foils, which are only 34 inches in length. The handle has just beneath the guard a ring in which the fencer inserts his fore and middle fingers to grasp firmly the weapon, which is further secured to the hand by a bandage; whereas the French use neither the ring nor the bandage. The guard to protect the hand is of metal in the Italian foil, and very large; in the French foil this is much smaller and lighter. The pure Italian school is in vogue only in lower Italy and Sicily, and the Neapolitan masters are justly celebrated for their adroitness in this particular method. The characteristic of the Neapolitan school (which more than any other partakes of the old Italian and Spanish) is to extend the arm so as constantly to present the point direct to the adversary's breast; the hand is kept in the centre of the person at nearly the elevation of the shoulder; the large guard between the handle and the blade serves somewhat the purpose of a little shield by causing the attacking point to glance off the hand of the fencer on the defensive, slightly bearing to the left or right (*carte* or *tierce*), according as he finds himself menaced. The arm being already fully extended has the tendency to keep an adversary at a distance, and also facilitates the lunge of the attacker. The fencer can also defend himself by a circle parry, which the Neapolitan makes by describing with the point a small circle 8 to 12 inches in diameter, for the purpose of catching up an adversary's point which may glide away from the engagement under the blade, menacing the lower line, or the upper one if it complete the disengagement. The arm and weapon being extended to the utmost presents a great temptation to try a *liement* (or leverage movement) upon it; but this being a weak point of the Neapolitan, he is always on the alert, and with a wonderful dexterity avoids the effect intended to be produced, and in his turn attacks with the greatest velocity. The Neapolitan throws his weight chiefly on the left leg

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as he stands on guard. He is a very embarrassing adversary, but the study of that school does not impart a general knowledge of the use of the sword, which has such a variety of modifications; it is a peculiarity, or so to speak a single chapter, finely executed. The Venetian school, of those of upper Italy, resembles most the Neapolitan; the Piedmontese is mixed, partaking of the old French and the Neapolitan. The Spanish school is a modification of the Neapolitan, in which the attack is assisted by extraordinary gymnastics of the leg, the fencer at times throwing himself nearly on the ground and attacking much in the lower line. This, like every other peculiarity, when well executed, is very embarrassing to one not accustomed to it. —When the French established a method of their own, the deviation from the Italian model consisted in the fencer having a less extended sword arm, the hand (medium guard) at the height of the breast, the elbow slightly bent, and the point of the sword at about the height of the eye. The knees were a little more bent, but the body was kept back as if to get out of reach of attack. Among the additions to the defence may be especially noted the half circle (old style), having the hand about level with the shoulder and the point depressed to the height of the waist, protecting the lower line to the left (*carte*), and being consequently the opposite of *seconde*, which bore the adversary's blade to the right. A new mode of attack was also introduced, termed *coupé*, or the cutting over the point instead of disengaging under the blade. The objection to this mode of attack lay in its requiring less delicacy of execution than the disengagement, which latter exercise was therefore neglected by many, and some got so habituated to repeat *coupé* after *coupé*, rushing forward, as even to continue to deliver them after their attack had been parried and the riposte delivered. Here were also introduced the *battement* or sharp tap preceding an attack, the effect of which is to make the person thus attacked grasp his foil nervously and thus render his hand for the moment rigid and unsuited to parry with rapidity. The change of engagement has much the same effect. Some disarms were introduced, but they are practically useless except when the hit is given by the same blow, for an adversary who is seen to be disarmed cannot be touched. Lafaugère introduced the *couronnement*, which was made by raising the hand instantly after the parry (*carte* or *tierce*), and with the forte of one's own blade mastering the feeble of the adversary's, then (as the latter in this situation tries to close the line of the riposte) turning or sliding the blade round it without quitting it, and delivering the riposte in the opposite line to that of the parry. Lafaugère often riposted, rising erect on the right foot after the lunge, thus bringing himself very close to his adversary.—The school of Bertrand is remarkable for many radical improvements. Instead of the medium guard, he always closes the line of the engagement. He keeps the point a little more out than the hand in carte, tierce, and seconde. While on guard he keeps the body equally weighing on both legs, and he bends the knees well so as to obtain greater elasticity of limb. He attacks always with an arm fully extended; yet so regular are his movements that there is no perceptible pause between the extension of the arm and the advance of the body in lunging; the onward movement of the point is continuous. His circle parries have a large sweep with the point to protect the whole person, but the hand does not participate in this sweep, the arm being immovable, and the wrist the pivot. The half-circle parry of Bertrand is made with the nails upward, the hand at the height and to the right of the forehead, the arm more than half extended, the point very slightly depressed and projecting leftward about as far as the line of the left shoulder, rather but not completely in the direction of the adversary. The blade in this parry catches up the attacking foil and exposes the entire body of the attacker to a riposte, which comes with incredible velocity, the point after the half-circle parry being very near to the breast of the opponent. The extreme velocity and precision of the riposte of Bertrand is one of the remarkable features of his school, and this he attains by making his pupils rely upon delicacy of touch, not on the eye. Bertrand said: "You must think and see with the ends of your fingers."—The instruction for the small sword is the basis of the attack and defence with every other weapon, because it gives to the fencer a just appreciation of the application of the principle of the lever in parries, and a regularity of movement, together with lightness of hand and velocity of execution; nevertheless almost every attack and parry with the broadsword is the reverse of those with the small sword. Instead of having the point further out than the hand on the side of the guard, the blade is kept across the body; instead of the touch being the guide, the eye principally directs the movements; instead of piercing with the point, the hit consists of a cut with the blade. These peculiarities being kept in view, the lines of parry are nearly similar to those of the small sword, the object being to prevent the cut from the adversary by stopping the action of his weapon by causing the feeble of his blade to be checked abruptly by the forte of one's own. The precise height therefore of the hand of him who parries must be regulated by his eye in conformity with the direction of the attack. The arms and legs are special objects of attack; they can be secured by the parry, or by rapidly and momentarily withdrawing from danger the limb menaced. The cut can be given as a blow, which tends to render the hand heavy; or with a light hand, which makes the cut razor fashion. There are also circle parries called *moulinets*, whereby the man who parries swings round his sword, describing a complete circle with the point, and having his own wrist

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as the pivot for the movement. A swordsman armed with a broadsword would, if fighting against an adversary armed with a small sword, keep at a distance from the latter, and would maim his limbs; whereas the latter would strive to thrust in his point whenever his opponent should raise his hand to strike. The use of the broadsword on horseback is but a variation of its application by a combatant on foot; the horseman is obliged to protect his horse as well as himself. Heavy cavalry are armed with long heavy swords, and hit heavily. The Turks have curved scymitars and adopt the razor cut; they also use swords weighted at the extremity, whereby they combine together the blow and the razor cut. The Germans have a long sword which they (students especially) manœuvre with an extended arm; it may be regarded as the Neapolitan school applied to the broadsword. The bayonet at the end of the musket is, when employed by a line of soldiers, a very formidable weapon; but for an isolated man it is, on account of the leverage it offers, of little use unless to defend himself against a mounted dragoon. The motion of the bayonets in line (the stock of the musket grasped by the right hand and the barrel steadied by the left) should be straight forward; any attempt to parry by leverage right or left would only cause a point to glance from one man into some other. The foot soldier isolated can parry head or body cuts and thrusts from sabre or lance, and can riposte by jerking forward or right or left the point, striking the horse if he miss the rider. Certain modern bayonets used for the rifle corps are very long, with a view to compensate in a measure for the shortness of the firearms at the end of which it is fixed. Such bayonets have beside their point an edge wherewith to cut. The lance is utterly worthless, except for cavalry, by whom it can be most efficiently employed in pursuing a routed foe; its use as a fencing weapon, therefore, requires little explanation. The knife or dagger requires quickness of hand and eye. The blow can be given by striking downward, straight forward, or upward; in the two latter cases the weapon is shifted from the ordinary grasp of the handle, so that the pommel rests in the palm of the hand and the stab is given with ease and force. The Spanish colonists employ their hats held in their left hands as shields, and also to mask the attack, concealing the knife behind the hat. The stick is a formidable weapon used to inflict blows, as with the broadsword; the ferrule end can as a point be most effectually driven into the face of an adversary. The quarterstaff is out of use; it was held in the middle and used not only in striking but in thrusting, when one end was suddenly driven forward like a bayonet.—There are few treatises on feucing. In 1536 Marozzo of Venice published the first work on the subject, and Grassi of Venice enlarged the principles already reduced to writing by his predecessor. St. Didier of Paris compiled them in 1573, after which Danet wrote in 1766; Laboessière of Paris in 1818 (*Traité de l'art des armes*); after whom Lafangère (teacher of the hussars of the guard) enriched rather than reformed the art in an elaborate work (*Nouveau manuel complet d'escrime*, Paris, 1837). Bertrand, who both enriched and reformed it, and is justly styled the father of the present school (teacher of the body guard of Charles X., and subsequently professor at the polytechnic school in Paris), has written nothiug; but his pupil Hugh Forbes has compiled and arranged his priuciples in a work in English and in French, entitled the "School of Bertrand"—*L'école de Bertrand*.

FÉNÉLON, François de Salignac de la Mothe, a French prelate and author, born at the chateau of Fénélon, Périgord, Aug. 6, 1651, died in Cambrai, Jan. 7, 1715. He was the son of Pons de Salignac, count of La Mothe Fénélon, and a nephew of the marquis of Féuélon, under whose care he received much of his education. At the age of 12 he was sent to the university of Cahors, and a few years later he removed to Paris in order to complete his course of philosophy in the college of Plessis. He next entered the theological seminary of St. Sulpice, under the direction of the abbé Tronson, and about 1675 received holy orders. He wished at first to devote himself to foreign missions, but this design was overruled; and after 3 years passed as a preacher and catechist at the church of St. Sulpice, he was appointed by the archbishop of Paris superior of the society of *Nouvelles Catholiques*, established for the instruction of female converts. Meanwhile he cultivated the friendship of the abbé Fleury and of Bossuet, bishop of Meaux, and was a frequent guest at the brilliant reunions which took place at the bishop's country seat. The distinguished society into which he was thus thrown, the charm of his manners, and his eloquence in the pulpit, soon drew him into public notice. To enable him to meet his expenses, one of his uncles, the bishop of Sarlat, gave him a small living at which he was not required to reside permanently. It yielded him 3,000 francs a year, much of which he spent upon the poor, and this until 1694 was his only income. His first public service was in the capacity of missionary to the Protestants in Saintonge and Poitou, after the revocation of the edict of Nantes. He was presented to Louis XIV. by Bossuet, and the only favor he asked of the king in acceptiug the office was that no violence should be used within the field of his mission. Aided by the abbés de Langeron and Fleury, but still more by his own mild and amiable character, he succeeded in winning over large numbers of the Protestants, and soon tranquillized a population whom persecution had roused to a dangerous excitement. On his return to Paris in 1689 Louis appointed him preceptor to his grandsons, the dukes of Burgundy, Anjou, and Berry. The first, the heir prospective to the throne, was a young prince equally remarkable for the brightness of his intellect and the viciousness of his temper. Comprehending at once the character

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of his pupil, Fénélon so wisely blended stern with gentle measures, that without breaking the youth's spirit he gained over him a control which seemed almost like fascination. The virtues which afterward illustrated the duke's short history, and the warm affection which he always cherished for his preceptor, are the best proofs of the abbé's skill and devotion. It was for the use of his royal pupils that Fénélon composed his "Dialogues of the Dead," "Direction for the Conscience of a King," "Abridgment of the Lives of Ancient Philosophers," and the "Adventures of Telemachus." But the success with which he discharged his important and delicate trust gained him for some time neither praise nor pecuniary reward. Louis, though not blind to his merit, was never his friend; but Mme. de Maintenon had long been one of his warmest admirers, and it was probably through her influence that he received in 1694 the rich abbacy of Saint Valery. Toward the close of this year he drafted the famous anonymous letter to the king, setting forth the disorders and abuses of his reign, which was first published by D'Alembert in his *Histoire des membres de l'académie Française*, and whose authenticity, after much dispute, was settled by the discovery of the original MS. in 1825. It is not probable that Louis suspected the author, for in the following February he nominated Fénélon to the archbishopric of Cambrai. The ceremony of consecration was performed in the chapel of St. Cyr, July 10, 1695, but the new prelate retained his connection with his pupils, with whom it was arranged that he should pass 3 months of every year. Honored by the king, beloved by the young princes, esteemed and consulted by the most influential person of the court, and holding high stations in the church and the palace, he was now at the height of his prosperity; but his disgrace was already preparing. With a natural tendency to all that is mild and spiritual in religion, he had long felt a sympathy for the doctrines of Mme. Guyon, whose system of "quietism" was attracting a large share of attention at court, and had gained proselytes in the king's household. She was charged with heresy, and demanded a commission to inquire into the matter. Bossuet and Tronson were appointed, and before their conferences were closed, Fénélon, having become archbishop, was added to the number. The decision, drawn up in 34 articles, 30 of which were composed by Bossuet and the others by Fénélon, conveyed a qualified censure of Mme. Guyon's doctrines, though it respected her character. Mme. Guyon, however, continued to disseminate her ideas, and Louis, who, like royal voluptuaries before him, aspired to be a theologian, caused her to be arrested. Bossuet composed his *Instruction sur les états d'oraison* to counteract the extraordinary effect which she had produced, and asked for his book the approbation of the archbishop of Cambrai. But Fénélon was unwilling to go further than he had already gone in opposition to a pious enthusiast whose errors he thought were rather those of too fervid language than of heretical opinion. After publishing an explanation of his course, with which the stern and uncompromising Bossuet was far from pleased, he gave to the world in 1697 his *Explication des maximes des saints*, which was judged to be little else than the advocacy of a mitigated quietism, and completed the separation between him and his former friend. A violent controversy was thus opened. Bossuet denounced him to the court as a fanatic; the king struck his name from the list of preceptors to the royal family, and ordered him to retire to his diocese; Mme. de Maintenon withdrew her favor, and his friendship for Mme. Guyon was even made a theme for the grossest calumnies. He refuted these slanders with little difficulty, and meanwhile sent the obnoxious book to Rome, where Louis used all his influence to obtain its condemnation. After a delay of 9 months Innocent XII. pronounced a mild censure of the *Maximes des saints*, but addressed at the same time to certain prelates who had been most severe in their attacks on the author the following caustic rebuke: *Peccavit excessu amoris divini, sed vos peccastis defectu amoris proximi* ("He has sinned through excess of divine love, but you have sinned through lack of love for your neighbor"). Immediately on receiving the sentence, in March, 1699, Fénélon hastened to declare his submission, and to publish the condemnation of his own book in a mandatory letter. In the following month his "Adventures of Telemachus," which had hitherto remained in manuscript, was given to the world by the dishonesty of a servant who had been employed to have the work copied, but who sold it to a bookseller without disclosing the author's name. The king having been told that it was from the pen of the archbishop of Cambrai, and probably sharing an unfounded suspicion then current that the book was a satire on the court, took measures to suppress it; but a few copies escaped seizure, and an imperfect edition was printed in Holland in 1699. Others followed rapidly, and for a long time the press was unable to keep up with the public demand. This event destroyed all hopes of restoration to royal favor, and for the rest of his life Fénélon devoted himself exclusively to the affairs of his diocese and to literary pursuits. It was now that his character was seen in its brightest light. He visited the peasants in their cottages, shared their humble fare, heard their complaints, relieved their wants, and made his palace an asylum for the unfortunate. His charities were enormous. When his diocese was traversed by hostile armies during the war of the Spanish succession, he was allowed to pass unhindered through the ranks of the enemy on his errands of benevolence. He removed the theological seminary of Valenciennes to Cambrai, and admitted no one to orders until he had himself examined him 5 times. Though in exile, he was not in retirement. Temperate and simple in his own tastes, he yet dispensed

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a polished and profuse hospitality, and made his table a favorite resort of the most distinguished persons. When his pupil the duke of Burgundy became dauphin by the death of his father, he addressed to him a "Plan of Government," proposing the establishment of states general and provincial, with many reforms in public administration; and had the prince lived to reign, it is thought that Fénélon would have been his prime minister. The archbishop did not long survive his pupil.—Of the excellence of Fénélon's best work, the "Adventures of Telemachus," no better proof could be given than its general and lasting popularity. It is said that no book except the Bible and the "Imitation of Christ" has been so often reprinted. Hallam denies it the high character of an epic, but gives it the first place among classical romances; and although the abandonment of verse, according to the same authority, has produced too much diffuseness, its purity of language, poetic spirit, richness of incident, and high lessons of politics and morals, claim for it the lasting admiration of posterity. His controversial writings, which comprise works against the Jansenists and Gallicans, on quietism, &c., are distinguished by that devotion to the church and gentleness of temper which characterized his life. His spiritual works, a collection of which (*Œuvres spirituelles*, 5 vols. 12mo.) appeared at Amsterdam in 1731, are used by persons of all denominations. His sermons (12mo., 1744), written during his youth, hold no very high place among productions of their kind, though not without eloquent passages. Among his other works are a *Traité de l'éducation des filles* (12mo., 1687), written at the request of the duchess of Beauvilliers; *Traité du ministère des pasteurs* (1688); *Démonstration de l'existence de Dieu* (1713), after "Telemachus" his longest and most important work; *Dialogues sur l'éloquence en général, et sur celle de la chaire en particulier*, with a *Lettre sur la rhétorique et la poésie*, addressed to the French academy (1718). The only complete edition of Fénélon's writings is that begun at Versailles in 1820 and finished at Paris in 1830 (34 vols. 8vo.). An edition appeared at Paris in 1787–'92 (9 vols. 4to.), to defray the cost of which the assembly of the clergy of France appropriated 40,000 livres; but this collection does not contain the *Maximes des saints*, the *Mandements*, nor the writings on Jansenism and quietism. Of the English translations of "Telemachus" the most esteemed is that of John Hawkesworth, LL.D. (4to., London, 1768, and 12mo., New York, 1859). The following may also be mentioned: by Smollett (2 vols. 12mo., 1776); in verse, by M. A. Meilan (4 vols. 8vo., 1776); in verse, by Gibbons Bagnal (2 vols. 8vo., Hereford, 1791); in blank verse, by J. Youde (3 vols. 12mo., 1793); with notes, by Joseph Robertson (2 vols. 12mo., London, 1795). The "Dialogues concerning Eloquence in General" were translated by W. Stevenson (8vo., London, 1722); the "Treatise on the Education of Daughters" was translated, "with an Original Chapter on Religious Studies," by Dr. T. F. Dibdin (8vo., Cheltenham, 1805); and the "Lives of the Ancient Philosophers" by John Cormack (2 vols. 12mo., Edinburgh, 1808). The "Demonstration of the Existence of God" (12mo., 1754), and the "Dialogues of the Dead" (12mo., 1757), were published by the Foulises at Glasgow. A selection from Fénélon's writings, with a memoir of his life, by Mrs. Follen, appeared in 1831 (16mo., Boston). Fénélon is known to have translated the Æneid for his pupils, but it was never printed, and the MS. is lost. His life has been written by the chevalier Ramsay (the Hague, 1723), the marquis of Fénélon, grand nephew of the archbishop (1747), Y. M. de Querbeuf (published with the Paris edition of 1787–'92), Cardinal Bausset (3 vols. 8vo., Paris, 1808; translated into English by Mudford, London, 1810, and abridged by Charles Butler, London, 1810), Lemaire (Paris, 1826), Beauchot (Lyons, 1829), Roy (Tours, 1842), Célarier (Paris, 1844), Villemain, Lamartine, &c. The *Histoire littéraire de Fénélon, ou revue historique et analytique de ses œuvres*, by the abbé Gosselin, appeared in 1843.

FENNEC, an African canine animal, resembling a diminutive fox, belonging to the genus *megalotis* (Illiger). So vulpine is its look, that Mr. Gray, in his catalogue of the British museum, calls it *vulpes Zaarensis* (Skiöld.). When first described by Bruce the traveller, its zoological position was so ill determined that Buffon, who gives a good figure of the animal, called it *l'anonyme;* it was referred to rodents and quadrumana by others; but Zimmermann, from the examination of the teeth, seems first to have detected its dog-like affinities, and placed it in the genus *canis;* but whoever discovered its true position, there can be no doubt that it belongs at the end of the canine family of digitigrade carnivora. From the enormous comparative size of the ears Illiger established the genus *megalotis*, which does not appear to differ much from *vulpes;* taking this well-selected name of the genus, and the name of its first scientific describer for the species, it may properly be called *M. Brucei* (Griff.). According to Bruce, the animal is 9 or 10 inches long, with a foxy snout, ears half as long as the body and broad in proportion; the color white, mixed with gray and fawn color; the tail yellow, dark at the end, long, with soft and bushy hair like that of a fox; the ears thin, and margined with white hairs. The dentition, general appearance, and habits are canine; the feet are 4-toed, with the rudiment of a 5th, and the nails are not retractile as Desmarest at first supposed. It inhabits northern Africa, particularly Abyssinia, Nubia, and Egypt. There seems to be a second species, nearly allied to but different from Bruce's fennec, the *M. Lalandii* (H. Smith); this is gray, with the hairs of the dorsal line longer and blacker than the rest, and the tufted tail black with a gray base. Rüppell gives the discovery of the first species to Skiölde-

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brand, a Swede, whom Bruce accuses of supplanting him by an unworthy artifice; he calls the fennec *canis zerda* (Zimm.), and makes it 23 inches long, including the tail, which is 8 inches. It lives in holes which it digs in the sand of the deserts, and not in trees as is supposed by Bruce; it is shy, very quick in its motions, and solitary; its food consists mainly of insects, especially locusts, eggs, dates, and other sweet fruits, and probably small animals; its bark resembles that of a dog, but is more shrill; the internal orifice of the ears is said to be very small.

FENNEL (*fœniculum*, Koch.), a genus of umbelliferous plants, to which the British species (*F. vulgare*, Willd.), found on chalky cliffs in the southern parts of England, belongs. It is cultivated for the sake of the pleasant aromatic qualities of its leaves. It is frequently to be met with in old gardens in the United States, relics of the once prevalent taste for herb culture. Its leaves are singularly spread out into finely cut and almost hair-like segments; its flowers are yellow, and the stalks of the plant are glaucous. Once introduced into the garden, it propagates itself for years. A more attractive kind is the *finochio* or Azorean fennel (*F. dulce*), an annual cultivated in Italy as celery is with us. Its seeds are sown thinly in a good spot of light, rich earth, not dry nor very wet, as it will not thrive in either extreme. When the plants have grown a little they should be thinned out so as to be 6 inches distant from each other. The earth is to be drawn up about the stems to blanch them for table use. It is considered advisable to sow fresh seeds every 3 weeks during the season, to insure a succession of the crop. Several other species of fennel are known, some of which are admired for their pungency. The seeds (or "half fruits") are flat on one side and convex on the other, seldom exceeding ¼ inch in length. They have a fragrant odor, and warm, pleasant taste. Their infusion in boiling water is used as a carminative, and, having no actively exciting qualities, is employed to disguise by its pleasant aromatic nature the flavor of disagreeable medicines, as senna and rhubarb.

FENTON, ELIJAH, an English poet, born in Shelton, Staffordshire, May 20, 1683, died in East Hampstead, Berkshire, July 13, 1730. He studied at Cambridge, but becoming a non-juror he was obliged to leave the university, after which he accompanied the earl of Orrery to Flanders as private secretary. On his return to England in 1705, he employed himself in school teaching. In 1710 Mr. St. John (afterward Lord Bolingbroke) persuaded him to give up his school under a promise of political employment, which remaining unfulfilled, Fenton found himself much embarrassed and in debt. Lord Orrery now confided to him the education of his son, and 6 years later Fenton became associated with Pope, who was then undertaking his version of the "Odyssey," and was in quest of assistants. According to Dr. Johnson, Fenton translated the 1st, 4th, 19th, and 20th books of that poem. In 1723 a tragedy entitled "Mariamne," which he brought out, had an immense success, and gained him more than £1,000. In 1727 he published a new edition of Milton's works, to which he prefixed a brief but elegant life of the author. This was soon followed by a fine annotated edition of Waller.

FENTRESS, a N. co. of Tenn., bordering on Ky., and drained by several affluents of Cumberland river; area, 570 sq. m.; pop. in 1850, 4,454, of whom 148 were slaves. The surface consists principally of high table-lands of the Cumberland mountains, affording excellent pastures. Timber is abundant, and coal is found in various places. The staple productions are grain and hay. In 1850 the county yielded 180,089 bushels of Indian corn, 26,366 of oats, 37,008 lbs. of butter, and 7,097 of wool. There were 5 churches, and 450 pupils attending public schools. Capital, Jamestown.

FENWICK, GEORGE, proprietor of part of Connecticut, came to America in 1636 to take charge of the plantation of Saybrook, so called after Lords Say and Brook, who, with others, in 1632 had procured a patent for the territory from Robert, earl of Warwick. Returning to England, he came back again in 1639, and from that time, as one of the patentees, and agent for the others, superintended and governed the settlement of Saybrook till 1644, when he sold its jurisdiction and territory to the Connecticut colony, as his associates had given up their contemplated removal to America. He afterward returned to England, where he was appointed one of the judges for the trial of Charles I., and died in 1657.

FÉNYES, ELEK, a Hungarian geographer and statistician, born in Csokaj, in the county of Bihar, in 1807. He took up his abode at Pesth in 1836, and became associated with the principal agricultural and industrial institutions and publications of that city. In 1839–'40 he published an "Account of the Present Condition of Hungary and Annexed Provinces," which obtained a prize of $500 from the national academy. This was followed by "Statistics of Hungary," which is highly esteemed both in Hungary and Germany. In 1847 he published a manual containing a synopsis of his principal works.

FERDINAND. The sovereigns of this name will be treated in the following order: Germany, Naples, Spain, Tuscany. Austria will be included under Germany, Sicily under Naples, and Aragon and Castile under Spain.

I. GERMANY.

FERDINAND I., emperor of Germany, a son of Philip I. of Spain, and younger brother of Charles V., born at Alcala, Spain, in 1503, inherited the duchy of Austria and other German possessions, was elected king of Hungary and Bohemia after the death of his brother-in-law Louis II. in the battle of Mohács (1526), and succeeded his brother Charles V., after his resignation, on the throne of Germany (1558). In Hungary, where he inaugurated the unpopular reign of the Habs-

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burgs, and was acknowledged only by a part of the nation, he had to wage a long war against his rival, the national king Zápolya, and the Turks under Solyman, who advanced as far as Vienna (1529). In Germany he was tolerant to the Protestants. He died in 1564. Of his 15 children Maximilian (II.) became his successor. —FERDINAND II., emperor of Germany (1619–'37), king of Bohemia (1617–'37) and Hungary (1618–'37), grandson of the preceding, and son of Charles, duke of Carinthia and Styria, born in 1578, died Feb. 15, 1637. He early imbibed a profound hatred of Protestantism, and vowed at Loretto its extermination. His bloody persecutions, and his disregard of statutes, charters, and promises, brought about the outbreak of the 30 years' war (1618), of which he survived the most memorable events, the battle of Prague (1520), won by his friend and chief supporter, Maximilian of Bavaria; the victories and assassination of Wallenstein (1634); the sack of Magdeburg by Tilly, and his defeat at Breitenfeld by Gustavus Adolphus (1631); the last victory of the Swedish king at Lützen (1632), and the victory of the imperialists at Nördlingen (1634). Simultaneously he waged war against Gabriel Bethlen of Transylvania, and the malcontents of Hungary. He was far from having reached the end of his bloody work when he died.—FERDINAND III., emperor of Germany and king of Hungary and Bohemia, son of the preceding, born in 1608, reigned from 1637 to 1657. He was of a milder and more tolerant disposition than his father, and during his reign the 30 years' war was terminated by the peace of Westphalia (1648). His son, who was crowned under the name of Ferdinand IV., as king of Bohemia, Hungary, and Rome, died before ascending the throne in 1654. His younger brother Leopold I., succeeded his father.

FERDINAND I., emperor of Austria, son of the last German emperor, Francis, born April 19, 1793, succeeded his father on the imperial throne of Austria, March 2, 1835. His weakness, bordering on imbecility, made him a mere puppet in the hands of his chief minister, Prince Metternich. In 1848 his kindness of heart would not allow him to suppress the revolution by violent means, and after having sanctioned and betrayed it, by decrees, oaths, and plots, all extorted from him, and after having fled repeatedly from his capital, he was prevailed upon, or rather compelled, by his crafty sister-in-law, the archduchess Sophia, to resign in favor of her son, the youthful Francis Joseph. Since that time he has mostly resided at Prague, enjoying in his retirement a certain degree of popularity with the masses, but without any political influence.

II. NAPLES.

FERDINAND I., first king of Naples, illegitimate son of Alfonso the Magnanimous, born in 1425, died Jan. 25, 1494. His father, who had ruled both Naples and Sicily, as well as Aragon and Sardinia, bequeathed to him at his death in 1458 the throne of Naples. His reign was troubled, and the nobles conspired to aid John of Anjou in a descent upon the country. Ferdinand lost the battle of Sarno in 1460, escaped to Naples with but 20 followers, and was reduced to the last extremity. He was, however, favored by Pope Pius II. and by Francesco Sforza, duke of Milan; and his partisans were greatly strengthened by the alliance of the Albanian chieftain Scanderbeg, who put himself at the head of the army of Ferdinand, defeated John of Anjou at Troja in 1462, and forced him to leave Italy. Ferdinand was cruel and revengeful. Count Piccinino was one of his illustrious victims. In this reign the Turks made a descent upon Italy and captured Otranto, and Ferdinand recovered this city from them in 1480. Five years later the nobles revolted again, and Ferdinand, after yielding to their demands, refused to fulfil his promises, and put the leader of the revolt to death. He was excommunicated by the pope, and died while the formidable expedition of Charles VIII. of France was preparing to set out toward Italy.

FERDINAND I., king of the Two Sicilies (or Ferdinand IV. of Naples), born in Naples, Jan. 12, 1751, died in the same city, Jan. 4, 1825. When in 1759 his father Charles III. became king of Spain, he succeeded him upon the throne of Naples, in accordance with a family statute which prohibited the reunion of the two crowns. In 1768 he married Caroline Maria, daughter of the empress Maria Theresa, and left the affairs of government to his imperious wife and her favorite minister Acton. The cabinet of Madrid lost all influence over the court of Naples, which closely allied itself with the cabinets of Vienna and London, and in 1794 joined the coalition against France. Though forced in 1796 to make peace with France, Ferdinand renewed the war after the departure of Napoleon to Egypt, and drew upon his kingdom the arms of the French, who in 1799 entered Naples. Ferdinand with his family escaped in an English fleet to Palermo, and the Parthenopian republic was instituted in Naples. But after a few months Ferdinand was restored to his capital by a Calabrian army under Cardinal Ruffo. A terrible inquisition now began against the republicans, the city was abandoned to the lazzaroni, and Ferdinand seemed to have returned only to shed the blood of his subjects. The successes of the French in Germany and Italy obliged Ferdinand in 1801 to sign a treaty under which he was forced to surrender a portion of his territory, and to support French troops in the remainder, thus putting Naples under the domination of France. When the war broke out in 1805 between France and Austria, the haughty Neapolitan queen thought it a favorable opportunity for throwing off the French yoke, and prompted Ferdinand to violate the treaty and to receive the support of an Anglo-Russian army. Hardly had he done this when Austria, conquered at Austerlitz, signed the treaty of Presburg. The *Moniteur* in a significant article declared that of 8 daughters of

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Maria Theresa, one had destroyed the Bourbon monarchy, the second had ruined the house of Parma, and now the third had lost the throne of Naples. Napoleon sent an army against Naples, obliged Ferdinand and his queen again to take refuge in Sicily, refused offers of negotiation, and in 1806 declared that the house of Bourbon had ceased to reign over that kingdom, and gave the throne first to his brother Joseph, and in 1808 to his brother-in-law Murat. Ferdinand, protected by England, was able to save Sicily from French conquest; but the queen, as little willing to bear English as French supremacy, embroiled herself with the English ambassador, Lord William Bentinck, and was obliged to leave the island in 1811, while Ferdinand was forced to resign his government to his son Francis. After Murat was dethroned by Austria in 1815, Ferdinand was restored to his former throne, and in 1817 united Sicily and Naples into a single state, under the title of the Two Sicilies. He abolished the constitution which he had been forced to grant in 1812, but was obliged to promise to restore it by a rising of the carbonari in 1820. He was soon after re-established in absolute power by the Austrians.

FERDINAND II., king of the Two Sicilies, grandson of the preceding, born in Palermo, Jan. 12, 1810, died in Naples, May 22, 1859. He succeeded his father Francis I. in 1830, and at once excited the most lively hopes by pardoning several political offenders and introducing economical reforms and liberal measures. Having thus lulled the revolutionary party, he changed his policy, adopting the principles of absolutism; and the history of the kingdom from that time is a history of conspiracies and rebellions, followed by trials, imprisonments, and executions. There were revolts in 1833, '37, '41, '44, and '47, but in every case order was restored by the prison and the scaffold. During the general agitation of 1848 all Sicily rose in rebellion, and 10,000 men in arms marched upon Naples to demand a more liberal government. A constitution was granted them, modelled after the French charter of 1830, but within a year Ferdinand dissolved the chambers, annihilated the constitution, and restored the ancient order of things. In 1849 Pope Pius IX. took refuge at Gaëta under his protection. In the contest with the insurgents Ferdinand had ordered the troops to bombard his rebellious cities, and thus obtained the epithet of *bombardatore*, abbreviated into "Bomba," by which he has often been designated. The harshest treatment was exercised toward the political prisoners in Naples, who were estimated by Mr. Gladstone in 1857 to number at least 13,000, though his statements were called in question by writers friendly to Ferdinand. In 1857 the seizure and confiscation of the Cagliari, a Sardinian merchant steamer in which revolutionists had been conveyed to Naples, led to a diplomatic rupture between Naples and Sardinia, France, and England, which lasted till after the accession of his son, Ferdinand III.

III. SPAIN.

FERDINAND I. (THE GREAT), king of Castile, Leon, and Galicia, born toward the beginning of the 11th century, died in Leon, Dec. 27, 1065. He was the 2d son of Sancho el Mayor, king of Navarre. In 1033 he received the hand of Sancha, the sister of Bermudo III. of Leon, and the title of king of Castile, this province being henceforth recognized as an independent sovereignty. On the death of Sancho in 1035, Bermudo attempted to reannex the new state to his dominion; but he was defeated and killed by Ferdinand in 1037. The young king of Castile forthwith claimed and received the crown of Leon, in right of his queen; and by able management and forbearance he reconciled to his cause many lords who at first had opposed his accession to the throne. He soon gained popularity by his respect for the laws of the country, his maintenance of the ancient *fueros*, and his strict administration of justice. His elder brother, Garcia III., king of Navarre, having attacked him in 1054, lost his life in a battle fought near Burgos, in the plains of Atapuerca. By this victory Ferdinand gained several districts which formerly belonged to Navarre, and became the most powerful among the Christian princes in the peninsula. He then turned his arms against the Mohammedans; in 1055 he crossed the Douro, seized many fortresses, and obtained great plunder and numerous captives. Two years later he took the important cities of Viseu and Lamego, and in the beginning of 1058 invested Coimbra, which he gained by capitulation, after a siege of 6 months. He had thus added to his dominion the whole country between the Douro and the Mondego. Toward the centre of the peninsula, he extended the boundary of Castile to the gates of Alcala de Henares, and carried hostilities into Valencia and Andalusia, compelling the emir of Seville to swear allegiance and to restore to him the relics of St. Isidoro. His last days were spent in extraordinary devotional exercises. Attacked by a sickness which he knew would be fatal, he returned to Leon; on the eve of his death he had himself carried to St. John's church, in a penitential habit, and breathed his last prostrated before the image of the saint.

FERDINAND III., saint, king of Castile and Leon, born in 1200, died in Seville, May 30, 1252. The son of King Alfonso IX. of Leon by Berengaria, queen of Castile, he was indebted to his mother for the latter kingdom, of which he was placed in possession in 1217. His power being firmly established, and the rebellious spirit of the Laras quelled, in 1225 he commenced against the Mohammedans a career of conquest which effectually broke the Arabian power in Spain. In concert with several other princes he first carried his arms through Murcia and Andalusia. Alfonso, dying in 1230, declared his marriage with Berengaria void, and designated his two daughters by his first marriage as his successors. Ferdinand interrupted his progress for a while to secure

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the inheritance, which he soon accomplished, and thus permanently united the kingdoms of Castile and Leon. Being now sovereign of Spain from the bay of Biscay to the banks of the Guadalquivir, and from the confines of Portugal to those of Aragon and Valencia, he was enabled to push his conquests with renewed energy. In 1233 he triumphed over Aben Hud, king of Murcia; he then successively obtained possession of Toledo, Cordova, Ubeda, Truxillo, Jaen, and finally Seville, which surrendered Nov. 23, 1248, after a siege of nearly 2 years. Ferdinand was an unsparing enemy of the Jews and Albigenses who had sought a refuge within his dominions. He was canonized by Pope Clement X. in 1671.

FERDINAND IV., king of Castile and Leon, born in Seville in 1285, died in 1312. He was only 10 years old when his father, Sancho IV., died, and he saw himself assailed at once by his uncle Enrique, who coveted the regency, by Don Juan Nuñez de Lara, who wanted to increase his estates, and by the infantes of La Cerda, who claimed the crown, and who, respectively aided by the kings of Portugal and Aragon, aimed at a partition of the kingdom. In these difficult circumstances the young king was preserved by the ability of his mother, Maria de Molina. She succeeded in dividing his enemies, conciliated the king of Portugal, whose daughter Constanza was married to Ferdinand, and also made an alliance with the king of Aragon. Ferdinand in 1305 made war upon the Mohammedans, gained advantages over them, and took Gibraltar. The order of Templars having been abolished by Clement V., he confiscated their property and shared their spoils with the other orders of chivalry. In an expedition against the Moors, having ordered the two brothers Carvajal to be put to death upon mere suspicion, they cited him to appear with them, in 30 days, before the judgment seat of God; and within the prescribed time he was found dead on his couch, on which he had been taking his siesta.

FERDINAND THE CATHOLIC, V. of Castile, II. of Aragon, III. of Naples, and II. of Sicily, born in Sos, in Aragon, March 10, 1452, died in Madrigalejo, Jan 23, 1516. The son of John II., king of Navarre and Aragon, and of his second wife, Juana Henriquez, he was, as early as 1468, through the influence of his mother, declared by his father king of Sicily and associate in the crown of Aragon. Oct. 19, 1469, he married, at Valladolid, Isabella, princess of Asturias, the sister and lawful heiress of King Henry IV. of Castile. On the demise of the latter, Dec. 12, 1474, Ferdinand and Isabella were proclaimed joint sovereigns of Castile. Several powerful nobles, among whom were the marquis of Villena, the archbishop of Toledo, and the grand master of Calatrava, aided by the king of Portugal, rose in arms in the name of Juana (called Beltraneja, from her supposed father, Beltran de la Cueva), whom the late king had recognized as his daughter, but who had been set aside by the cortes on a charge of illegitimacy, which was never legally proved. Finally in 1479 a treaty put an end to the civil war, and Juana, deserted by all her partisans, took the veil. John II. having died at the beginning of the same year, Ferdinand inherited Aragon, and thus became the undisputed master of the peninsula, with the exception of Portugal, Navarre, and Granada. He now pursued a threefold policy: the extirpation of highwaymen, the curtailment of the immunities of the barons, and the maintenance of the Christian faith. The first had become very numerous during the civil wars, and their boldness had increased through the inefficiency of the general and local governments. They not only robbed travellers and merchants on the roads, but getting possession of castles in which they fortified themselves, they spread terror all over the country, levying tribute even on towns and villages. In this they were frequently aided by the nobles. The ordinary weapons of justice were powerless against them; but Ferdinand appealed to the people, and encouraged the organization of a militia and the union between townsmen and villagers, who took arms to protect their lives and property, thus reviving one of the most respected and useful institutions of old Spain, the *hermandad*, or brotherhood, which soon destroyed the bands of highwaymen and reëstablished order and security. This brotherhood, which had existed at intervals and exercised great influence in Castile since 1295, was reorganized in 1476, perfected during the following years, and, its primary object being accomplished, greatly modified in 1498. Ferdinand improved this element of power in his struggle against the nobles, in which it again did good service; cities, towns, and villages threw off the yoke of their lords, while the king himself, by subjecting the nobles to the ordinary tribunals of justice, inflicted a deadly blow on their already diminished influence. He meanwhile succeeded in vesting in the crown the mastership of the great military orders. On the death of the grand master of Calatrava, in 1487, he forbade the election of a successor, assumed the administration of the order, and procured the papal sanction for this profitable usurpation. The orders of Alcantara and Santiago were dealt with in nearly the same manner, the first in 1494 and the second in 1499, and the chief dignity of both likewise became merged for ever in the person of the reigning monarch. But it was against apostates, or converts who after baptism reverted to Judaism or Islamism, that Ferdinand evinced a zeal which in many cases amounted to implacable hatred. The king (Isabella giving a reluctant consent) in 1478 obtained from Pope Sixtus IV. permission to establish the inquisition in Castile, with unlimited power over the property and lives of all religious delinquents. The intolerance was perhaps still greater against the Jews than the relapsed heretics. On March 30, 1492, an edict for their expulsion was issued by the sovereigns at Granada. The number thus driven forth is estimated by some as high as 800,000, but by others, according to Prescott with

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more probability, at 160,000. Overwhelmed with misery, they sought refuge in Portugal, France, Italy, Africa, and the Levant. Before this, however, Ferdinand and Isabella had succeeded in accomplishing their long cherished design of destroying the last vestige of Moorish power in Spain. The kingdom of Granada, all that remained of the once powerful empire of the Moors, succumbed to the assaults of the Christian warriors; the city itself, the siege of which was conducted by the king and queen in person, surrendered Jan. 2, 1492, after a heroic resistance; and the last of its sovereigns, Abdallah or Boabdil, retired to Africa. That great event was soon followed by a far greater one: Columbus, sailing under the Castilian flag, discovered the western hemisphere; but in this Ferdinand had little if any share; he evinced no disposition to assist the discoverer, and the glory of having helped Columbus belongs exclusively to Isabella. Charles VIII. of France having conquered the kingdom of Naples in 1494, Ferdinand sent thither his great general Gonzalvo de Cordova, and within a few months the French were expelled and the Spaniards got a foothold in Italy, which advantage they afterward improved. In 1500 he concluded a treaty of alliance with Louis XII. of France, by which the two monarchs divided between themselves beforehand the kingdom, which was to be conquered by their united forces. The plan succeeded through French valor and Castilian cunning; but scarcely was this accomplished when the allies quarrelled, and Gonzalvo de Cordova, for the 2d time, drove the French out of southern Italy, which thenceforth remained in the hands of Ferdinand. Family difficulties interfered for a while with his power and the progress of his conquests. Juana, the only daughter left to him (Isabella having been married to Emanuel of Portugal, and Catharine to Prince Arthur, afterward to Henry VIII., of England), had been married in 1496 to the archduke Philip, son of the emperor Maximilian; and on the death of Isabella, in 1504, this young prince claimed the regency of Castile, in the name of his wife. This brought on a contest between him and his father-in-law, which, however, terminated in favor of Ferdinand by the premature death of Philip in 1506. The king found himself still at liberty to give undivided attention to the affairs of Italy, and exercise there a paramount influence, not by his arms only, but by his superior political talents. He took part in the league of Cambrai against Venice in 1508; then in the holy league in 1511 against the French, whom the princes of Italy desired to expel from the peninsula; and in all these transactions he was generally the gainer. Beside the kingdom of Naples, he added to his dominions several towns and fortresses on the coast of Africa, which were conquered by Cardinal Ximenes and Count Navarro in 1509 and 1510, and the kingdom of Navarre, which he wrested from Catharine de Foix and her husband, Jean d'Albret, in 1512. By a singular whim, or perhaps through the troubles created by the archduke Philip, Ferdinand had been estranged from his grandson, Charles of Luxemburg, afterward emperor under the title of Charles V.; and he thought of depriving him of part at least of his inheritance. He had consequently married in 1505 Germaine de Foix, a niece of King Louis XII. of France; but the child he had by her died, and he was disappointed in his hopes. In 1513 he took a philtre for the purpose of restoring his exhausted vigor; but the potion only destroyed his constitution and produced a lingering illness which ended in death. Ferdinand was the founder of the greatness of Spain; he consolidated the whole peninsula, with the exception of Portugal, into a single political body; gained for the crown a power which it had never possessed before; extended its influence beyond the peninsula, and gave it weight in the general affairs of Europe. To reach the aim of his ambition he was far from being over scrupulous in his means; a crafty politician, he did not hesitate to break his royal word, or even his oath, when interest or bigotry commanded. But notwithstanding his perfidy and treachery, his memory has been held in great reverence in Spain; and the severity shown toward him by some historians, especially the French, cannot prevent posterity from regarding him as the ablest prince of his age. A just appreciation of his life and times may be found in Prescott's "History of Ferdinand and Isabella." (See ISABELLA.)

FERDINAND VII., king of Spain, born in San Ildefonso, Oct. 13, 1784, died in Madrid, Sept. 29, 1833. He was the eldest son of Charles IV. and Luisa Maria of Parma. In 1789 he was declared prince of Asturias and heir apparent to the crown. Under the influence of his preceptor, the canon Escoiquiz, he early felt a strong aversion to Godoy, the notorious Prince of the Peace, the favorite of both his parents. This was aggravated by Maria Antonietta of Naples, whom he married in 1802, and kindled into hatred in 1806 upon the sudden death of his wife, whom he asserted without sufficient proofs to have been poisoned. Henceforth two hostile factions openly divided the court: that of Godoy, supported by the king and queen, and that of the prince of Asturias, comprising the great majority of the nation, who shared in his hatred of the favorite. The dissensions between the son and the father, who was but a tool in the hands of his queen and Godoy, grew into scandalous quarrels. The crown prince, at the instigation of Escoiquiz and others, addressed a letter to Napoleon, complaining of Godoy's conduct, and proposing to place himself under his protection, and to marry a member of his family. He also copied a memorial to the king against Godoy, which he was to have read to him in person; but Charles being made aware of his proceedings, and yielding to the solicitations of Luisa Maria, had him arrested, and kept in close confinement. A royal proclamation issued Oct. 30, 1807, denounced Ferdinand as having laid a plot against the power and even

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the life of his father. This, however, failed to make an impression against the prince. His own pliancy and Godoy's want of decision prevented matters from being pushed to extremes. In a vague but humble letter, Ferdinand confessed that he had sinned against his father and king, implored forgiveness, and was publicly pardoned. These transactions were soon followed by more serious events. The royal family, who acted under the advice of Godoy, having attempted to leave Aranjuez with the ultimate view of embarking for America, a sedition broke out, March 18, 1808; the departure was prevented, and the people, infuriated against Godoy, stormed his palace, seized, wounded, and would have murdered him, had not the prince of Asturias, moved by the tears of his mother, used his influence over the crowd to save his life. The king was so much frightened that he abdicated the next day in favor of his son. Two days later he attempted a retraction, maintaining that his abdication had been forced; but the prince, who had been active in all these transactions, assumed the title of king, and made his solemn entry into Madrid, March 24. The peninsula was already invaded by French troops, and Murat soon marched into the capital. Ferdinand hoped to conciliate Napoleon by submission; he went as far as Bayonne to meet him; here, notwithstanding the empty honors which were paid to him, he found himself a prisoner, and was made to understand that he must restore the crown to his father. The old king, his queen, her favorite, and the infantes had also been brought to Bayonne; interviews were held between the members of the royal family in presence of Napoleon; degrading scenes took place between Ferdinand and his parents; and yielding to a pressure he was unable to resist, Ferdinand assented, May 6, to the surrender of his royal title. But this title, and all the rights it conferred, had already been resigned by Charles into the hands of Napoleon. The emperor declared that "the house of Bourbon had ceased to reign in Spain," and placed his brother Joseph on the vacant throne. Ferdinand was immediately transferred to the castle of Valençay, the property of Talleyrand. Meanwhile the Spanish nation rose in arms, and Napoleon, in the hope of diverting Spain from the coalition against him, liberated his captive; by the treaty of Dec. 11, 1813, he restored to him the Spanish crown, on condition that he would make the English evacuate the peninsula, secure a large income to his parents, and keep in their offices and immunities all the Spaniards who had been in the service of King Joseph. On March 3, 1814, Ferdinand left his prison; and on his arrival in Spain he was welcomed by popular acclamations. His progress to Madrid was a triumph; but his return became the signal of the most dreadful reaction. That he did not abide by the terms of his treaty with Napoleon, that he expelled at once all the *afrancesados*, was nothing surprising; but he went much further; all the proceedings of the cortes, whose energetic measures had powerfully aided in the national resistance, were annulled; the old despotism, with all its abuses, was reëstablished; and persecution was directed against the very men who had most strenuously resisted the French invasion, their attachment to constitutional freedom being deemed to outweigh their former services. All the members of the cortes or the regencies, all those who had participated in the framing of the constitution of 1812 or had faithfully adhered to it, were arraigned before courts martial, tried, and sentenced. A number perished on the scaffold; hundreds of the most illustrious were sent to dungeons in Africa or imprisoned at home; the most fortunate were exiled. For 6 years Spain was given up to the unrelenting cruelty of a revengeful tyrant. At last discontent ripened into insurrection, the signal for which was given by the army. Troops assembled at the isle of Leon to sail for South America revolted under Col. Riego, Jan. 1, 1820, and proclaimed the constitution of 1812, and the whole army followed their example. Ferdinand convoked the cortes and swore (March 9) faithfully to observe the instrument he had formerly annulled. Under the influence of a provisional junta who assumed the direction of affairs, he abolished the inquisition, banished the Jesuits, and reëstablished the freedom of the press. On the opening of the cortes, July 9, he renewed his oath to the constitution, and appeared to act in perfect accord with that assembly, while at the same time he was intriguing to defeat the plans of his own cabinet and to encourage the plots of the opposite party. This double dealing soon brought about bloody riots and finally civil war in the capital and nearly all the provinces. The liberals or constitutionalists, who formed a large majority of the nation, were strenuously opposed by the serviles or ultra royalists. The latter, pretending that the king was a prisoner in the hands of the cortes, organized an apostolic junta, and raised bands of insurgents in Navarre and Catalonia, under the name of "army of the faith." Monks and friars, among whom Merino was conspicuous, were at the head of these bands. At Madrid, the royal guards, secretly incited by their own master, attempted in July, 1822, to reëstablish by force his absolute power; but after a violent struggle they were put down. Henceforth the constitutionalists held Ferdinand in a kind of imprisonment scarcely disguised under court ceremonial. A liberal ministry was appointed; energetic measures were resorted to; the "army of the faith" was totally defeated; its chiefs and soldiers, as well as the ultra-royalist committee known as the regency of Urgel, fled to France. The revolution was thus triumphant; but the "holy alliance" were preparing for its overthrow. France, which had assembled an army of observation near the Pyrénées, received orders from the congress of Verona to march into Spain for the purpose of restoring Ferdinand's authority. On the news of the threatened invasion, the king was removed to Seville, March

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20, 1823; and on the rapid advance of the French through the peninsula, he was declared to be insane, suspended from his power, superseded by a regency, and taken to Cadiz, where the constitutionalists intended to make a stand. But this project was baffled by the French army, which stormed the Trocadero, Sept. 15. The cortes then decided on declaring King Ferdinand reëstablished; and the monarch at once published (Sept. 30) a proclamation granting a general amnesty, and securing the engagements entered into by the constitutional government. But having left Cadiz the next day, he revoked the proclamation and all his acts since March 7, 1820; he made his solemn entrance into Madrid, with the applause of the ultra royalists, Nov. 13, and the work of vengeance commenced, and was continued for years. The noblest victims fell under the sword of the executioner, and terror reigned throughout Spain. Ferdinand did not even evince the least forbearance toward those who had served him most faithfully, but used his power against his friends as well as his foes. He had already been married 3 times and had no children, and took as his 4th wife, Oct. 11, 1829, Maria Christina, daughter of King Francis of Naples. This queen, much younger than her husband, gave him a daughter, Isabel, and procured from him the publication of a decree abrogating the Salic law. This excited the anger of the partisans of Don Carlos, the king's brother; and insurrectionary movements broke out in the provinces, while intrigues were set on foot at the court for the recall of the decree. During a temporary illness the king was prevailed upon to abrogate it; but Christina, resuming her sway over her husband's mind, had it confirmed, and received herself the title of regent, while Carlos and many of his adherents were ordered out of the kingdom. This rekindled civil war, which broke out with great violence, soon after the death of Ferdinand. His daughter, scarcely 4 years old, inherited the crown; but it was not secured to her till after a protracted and bloody contest.

IV. TUSCANY.

FERDINAND III., grand duke of Tuscany and archduke of Austria, born in Florence, May 6, 1769, died in the same city, June 18, 1824. He came into possession of Tuscany in 1790, when his father Leopold II. was called to the imperial throne of Germany. In the difficult period following the French revolution, he maintained a strict neutrality in the war against the French republic, which he was the first sovereign to recognize. By the treaty of Luneville in 1801 he lost the sovereignty of Tuscany, but in 1803 obtained as indemnity the archbishopric of Saltzburg, with the title of elector of the empire. This electorate he exchanged in 1805 for the grand duchy of Würzburg, and was admitted into the confederation of the Rhine. After Napoleon's abdication in 1814 Ferdinand was restored to the grand duchy of Tuscany, but was again obliged to abandon his capital for a short time in 1815, when Murat proclaimed the independence of Italy. The battle of Waterloo restored him to his throne.

FERGUSON, ADAM, a Scotch philosopher and historian, born in Logierait, Perthshire, June 20, 1723, died in St. Andrew's, Feb. 22, 1816. He was educated in Perth, and in the university of St. Andrew's. He selected the clerical profession, and studied in Edinburgh, where he became associated with Robertson, Blair, and Home. In 1745, though he had studied but half the required term, he was ordained, in consequence of having been selected for his knowledge of the Erse language to act as chaplain of one of the highland regiments, which he accompanied to Flanders. He remained in this situation till 1757, when he became conspicuous by his defence of the morality of stage plays, written upon occasion of the success of his friend Home's tragedy of "Douglas." In 1759 he was elected professor of natural philosophy in the university of Edinburgh, a position which he exchanged 5 years later for the chair of moral philosophy. In 1778 he came to America as secretary of the commission appointed to negotiate with the revolted colonies, his place in the university being supplied during his year's absence by Dugald Stewart, who in 1785 became his successor. In his 70th year Dr. Ferguson paid a visit to the principal cities of the continent, and was elected a member of several learned societies. The last years of his life were passed in St. Andrew's, where he observed a strictly Pythagorean diet. His "History of the Progress and Termination of the Roman Republic," published in 1783, is valuable for its philosophical reflections, clearness of style, and masterly portraitures of character. His "Essay on the History of Civil Society," which appeared in 1766, discusses the origin, end, and form of government, affirms the natural sociability of men, in opposition to the hypothesis of Hobbes of their natural hostility, and defends civilization against the charges of Rousseau. His philosophical views are contained in his "Institutes of Moral Philosophy," published in 1769, and in his "Principles of Moral and Political Science," published in 1792. He belongs by his general method to the school of Bacon, recommending everywhere experience and the study of facts as the condition of successful research into moral and physical laws.

FERGUSON, JAMES, a Scotch experimental philosopher and astronomer, born near Keith in Banffshire in 1710, died in London in 1776. He was the son of a peasant, and when only 7 or 8 years old his attention was turned to the study of mechanics by seeing his father use a beam for a lever, and a prop for a fulcrum. He occupied himself with drawing diagrams and constructing models till he understood some of the more remarkable properties of the mechanical powers. While employed in tending sheep he acquired the rudiments of his astronomical knowledge. His taste for drawing was also very decided, and he cultivated it with such assiduity that at length he became able to

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support himself by taking portraits during the prosecution of his studies at Edinburgh. In 1743 he removed to London. In 1747 he published his first work, "A Dissertation on the Phenomena of the Harvest Moon;" and in 1748 he delivered in the metropolis a course of lectures on experimental philosophy and astronomy, which were so well received that he subsequently repeated them in most of the principal towns in England. George III. settled on him a pension of £50 a year. In 1763 he was elected a fellow of the royal society, and in 1770 a member of the American philosophical society. His latter years were mostly devoted to the delivery of his lectures, which had become very popular. The most important of his works are "Astronomy Explained on Sir Isaac Newton's Principles" (4to., London, 1756); "Lectures on Mechanics, &c." (8vo., 1760); "An Easy Introduction to Astronomy" (8vo., 1769); and an "Introduction to Electricity" (8vo., 1770.) Sir David Brewster published corrected editions of his "Lectures" and "Astronomy" in 1805 and 1811.

FERGUSON, Samuel, an Irish poet and prose writer, born in Belfast in 1810. His first writings, among which was "Willy Gallilland," were published in the "Ulster Magazine." In Feb. 1832, his ballad, the "Forging of the Anchor," appeared in "Blackwood," and was introduced into the "Noctes." It is perhaps his finest composition. He continued to write for "Blackwood," and in 1834 became connected with the "Dublin University Magazine," which he afterward for a time conducted. His aim to elevate the standard of Irish literature and to reprove the caricaturists of Irish life appears in his "Hibernian Nights' Entertainments" (republished in New York, 1857), and in his papers on Hardiman's collection of Irish minstrelsy (1834). He was called to the bar in 1838, and continues to practise his profession and to contribute to the "Dublin University Magazine."

FERGUSSON, James, a British architect and writer on art, born in Ayr, Scotland, in 1808. He was educated at the high school of Edinburgh, and after several years' experience in a counting house in Holland and England, went in 1829 to India, where for 10 years he was engaged in mercantile pursuits. Returning to England, he devoted himself to the study of art and literature. During his residence in India he had taken great interest in the ancient architectural remains, and among the fruits of his observations was a description of the rock-cut temples of Hindostan, with illustrations by himself (1845), and "Picturesque Illustrations of Ancient Architecture in Hindostan" (1847–'8). In 1847 he published "Ancient Topography of Jerusalem," in which he undertook to show that the building known as the mosque of Omar is the church of the holy sepulchre. In 1849 appeared the 1st volume of his "Historical Inquiry into the True Principles of Beauty and Art, more especially with reference to Architecture," which was succeeded by the "Illustrated Handbook of Architecture" (1855), in the preparation of which he used the materials already collected for the succeeding volumes of the former work. In these works he gives a complete survey of the architectural monuments of the chief nations of ancient and modern times, and offers many suggestions of great practical value. His "Palaces of Nineveh and Persepolis Restored" (1851), published while Mr. Layard's excavations were proceeding, exhibits a profound knowledge of the architecture of the Assyrians and Persians; and upon the subsequent establishment of the crystal palace at Sydenham, of which he was the general manager for some time after its opening, he personally superintended the arrangement of the Assyrian court. His attention had been drawn in India to the use and application of earthworks in modern fortifications, and he proposed the substitution of circular forms for angles and bastions, and of earthworks for masonry. On this subject he has also published the "Peril of Portsmouth," and "Portsmouth Protected."

FERISHTAH, Mohammed Casim, a Persian historian of India, born in Asterabad, near the Caspian sea, in 1570, died in 1611. His father left his native country to travel in India, where he settled in the Deccan as instructor to the son of the reigning prince. The young Ferishtah was advanced to honors at court, and after the civil commotions and changes of government in the province in which he had lived, repaired to the court of Ibrahim Adil Shah in Bejapore, where he passed the remainder of his life, and wrote his history. This work, one of the most authoritative of oriental histories, was published in 1606, contains all the facts which the author deemed worthy to extract from more than 30 older histories, and is still in India the most popular history of the country. The introduction gives a brief account of India prior to the Mohammedan conquest, and then follows in 12 books a history of the kings of the different provinces, and of the European settlers. At the conclusion there is a short account of the geography, climate, and other physical circumstances of the country. After having been several times partially translated into English, the whole work, with the exception of some passages which have been since discovered, was published in London in 1829 by Col. John Briggs, under the title of the "History of the Rise and Progress of the Mohammedan Power in India, from its commencement in 1000 to 1620." Col. Briggs also published an edition in Persian at Bombay in 1831.

FERMANAGH, an inland co. of Ireland, province of Ulster; greatest length from N. W. to S. E. 45 m., greatest breadth 26 m.; area, 714 sq. m.; pop. in 1851, 116,007. It lies almost wholly in the basin of Lough Erne, which divides it lengthwise into two nearly equal portions, and is itself composed of two lakes, connected by a short river. Its W. part, on the borders of the counties of Leitrim and Cavan, is mountainous, and the rest of the surface is di-

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versified by steep hills. The soil is as varied as the surface, but except a wide belt in the S. is not remarkably fertile. The productions are oats, barley, wheat, flax, potatoes, turnips, and hay. Cattle are bred on the high grounds, and butter, eggs, &c., are exported. Limestone, marl, potter's clay, and small quantities of coal and iron, are the chief mineral products. Timber is more abundant than in most Irish counties, but is grown principally on the large estates, many parts of the county having a barren and desolate appearance. There are no important manufactures, and few large towns; those worthy of notice are Enniskillen, Lisnaskea, and Lowtherstown. The county returns two members to the house of commons.

FERMENTATION, a term applied to various spontaneous changes which take place in organic matters after life has ceased. In these changes, the occurrence of which is dependent on a certain degree of heat and moisture, the elements of the bodies enter into new combinations among themselves, heat and gaseous mixtures being eliminated. Several kinds of fermentation are distinguished by chemists, and the tendency of chemical science is to refer to this principle a great variety of chemical changes. Formerly only 4 kinds of fermentation were recognized, viz.: the vinous, panary, acetous, and putrefactive; and some chemists still admit but 3, omitting the second named. The process is induced in an aqueous solution of suitable temperature by the presence of a nitrogenous organic body, which it is believed must itself be in a state of change or decay. Yeast or leaven is a familiar example of this substance, called the ferment. The principle has been variously explained by different authorities. Mitscherlich refers it to a vegetable production, and in the case of putrefaction to the action of a certain species of infusoria. Berzelius and others suppose that fermentation is produced by catalysis, the mere presence or contact of the ferment being sufficient to produce the phenomena in the other bodies, without itself contributing its own elements to the new compound. Liebig supposes that the chemical change taking place in the ferment, which is itself in a state of decomposition through the oxidizing action of the air, communicates a chemical or molecular movement to the elements of the other bodies in contact, inducing their rearrangement in other forms. The subject is incidentally treated in numerous articles in this work, and reference may be made to Acetic Acid, Alcohol, Brewing, Catalysis, Eremacausis, Putrefaction, and Yeast.

FERNANDO DE NORONHA, a group of small islands in the Atlantic ocean, belonging to Brazil, situated about 210 m. N. E. of Cape St. Roque; lat. of S. E. extremity of the principal island, 3° 50′ S., long. 32° 28′ W. The shores of these islands are rocky, and difficult of access on account of the violence of the surf. The largest island, which gives the name to the group, is about 20 m. in circumference. In it is a conical mountain about 1,000 feet high, the upper part of which is very steep, and on one side overhangs its base. It is composed of phonolitic rock, which has been severed into irregular columns. The whole island is covered with wood, but such is the aridity of its climate, there being sometimes no rain for 2 years, that vegetable production is very limited. The island contains 2 harbors, and its coasts abound with fish. It is used as a place of banishment by Brazil, whose government maintains a garrison there to prevent the escape of criminals. No woman is permitted to land on it. Another of these islands is about 1 m. square, and the rest are mere rocky islets, separated from the main island by very narrow channels.

FERNANDO PO, an island in the bight of Biafra, W. coast of Africa, about 25 m. from the main land, lying between lat. 3° 12′ and 3° 17′ N., and long. 8° 26′ and 8° 57′ E.; pop. estimated at from 10,000 to 12,000. It is about 44 m. long and 20 m. broad. Rising in bold precipitous cliffs from the sea, its surface gradually becomes more and more elevated, until in Clarence Peak, near the N. extremity of the island, it attains an altitude of 10,650 feet. The rocks are wholly of volcanic formation. The soil, which is mostly covered with wood, is everywhere well watered and fertile. The scenery is exceedingly picturesque and beautiful, the highest summits and the deepest vales being alike adorned with luxuriant vegetation. The principal vegetable products are palms, the magnificent bombax, or silk cotton tree, the goora or sterculia, a species of ebony, the sugar cane, here growing wild, and yams, which form the staple food of the inhabitants. The most numerous quadrupeds are antelopes, monkeys, squirrels, and rats. The rivers abound in fish, but are also infested with alligators. The climate was once esteemed salubrious, but the majority of the Europeans who ventured to settle on the island having been carried off by fever, the British garrison was withdrawn in 1834. The coast is indented with several creeks and bays, the most capacious of which is Maidstone bay, at the N. E. extremity, where is situated the capital, Clarencetown (pop. 800 to 900), which was founded by the British in 1827, and is now chiefly inhabited by emancipated negroes from Sierra Leone. The aborigines of Fernando Po, called Edeeyahs, are widely different in appearance and language from the natives of the continent. They are of lighter complexion and better features, well made and muscular, and in disposition brave, generous, and amiable. Their dwellings are of very rude construction, consisting merely of palm-leaf mats thrown loosely over upright poles. This island was discovered by the Portuguese in 1471, and named after the leader of the expedition. In 1778 it was ceded to the Spaniards, who attempted to colonize it, but were repelled by the natives. In 1827 Spain permitted it to be occupied by the British, who soon abandoned it on account of its insalubrity; since which pe-

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riod the Spaniards have again claimed it and changed its name to Puerto de Isabel.

FERNEY, or FERNEX, a French town in the department of Ain, on the frontier of Switzerland, at the foot of the Jura mountains, about 5 m. from Geneva. It was a place of refuge for the Huguenots during the era of religious persecution in France, and was for 20 years the residence of Voltaire. When he bought the land, about 1758, Ferney was a miserable hamlet, consisting only of a few hovels. By his exertions it became a prosperous town, with nearly 1,500 inhabitants. He drained and cultivated the adjacent grounds, and caused Geneva watchmakers and other industrious artisans to settle there, while the constant concourse of visitors and travellers contributed to enhance the general prosperity. The death of Voltaire proved disastrous to the industry of the place, the persons employed in the manufacture of watches being reduced from 800 to about 200; but the inhabitants still cherish the remembrance of their benefactor, and admirers of Voltaire still make pilgrimages to Ferney. The château in which he lived has undergone many alterations, so that but few relics of him remain. His long cane, his seal, his silver inkstand, one of his wigs, his cap of white satin embroidered with gold, his MS. correspondence with Frederic the Great, and the library of his last secretary Wagnière, are all the curiosities which are left for the inspection of visitors. Adjoining the château are two small edifices, one the theatre and the other the church built by the philosopher. Upon the porch of the latter is the following inscription: *Deo erexit Voltarius*. In front of the château is the mausoleum which he had built with the utmost attention to artistic execution.

FERNS (*filices*, Jussieu), commonly herbaceous plants, with permanent root-like stems, buried under the soil, and emitting fibres from their surfaces, creeping over the surrounding objects, such as the stems of other plants or their roots, or between the crevices of rocks, and producing from their extremities a succession of new leaves from year to year. Sometimes the stem assumes an upright position, elongating into a simple trunk, and rising to the height of 50 or 60 feet, becoming then the most gigantic of the acrogens or flowerless plants, approaching the palms through the *cycadaceæ*, and vieing with them in beauty. These tree ferns are chiefly to be met with in the torrid zone, and there only are they found in abundance. Indeed, it has been thought that they were confined to the equatorial regions, but Mertens found them of 50 feet in height near Japan, in lat. 28°. R. Brown speaks of arborescent ferns at the southern extremity of Van Diemen's Land, and even at Dusky bay in New Zealand, near lat. 46°. The interior of the trunk of the tree ferns consists of a cellular substance, which often disappears, and among which bundles of fibro-vascular tissues are sometimes mixed; beyond the cellular centre lies a zone of woody plates, much folded and plaited, which communicate with the footstalks of the leaves, and which commonly present a horse-shoe appearance when cut across. Each of these woody plates is soft in the interior, where the texture principally consists of scalariform and pitted vessels and cells; the whole covered with a hard cellular integument, which serves instead of bark. The trunks seem always to produce roots in great abundance from their surface, even when elevated in the air, clothing them, especially near the ground, with a thick matting, and affording ample means of nutrition, and perhaps some kind of protection. The same general structure as that of the tree ferns may be seen in the herbaceous species, such as are common in temperate and boreal regions. The leaves of the ferns are called fronds, and are inserted upon the stem by an angular base; they are often of considerable size, and are cut into repeated divisions called *pinnæ*. Each leaf and leaflet (*pinna*) is penetrated by veins, and so diverse are these that a kind of natural arrangement of genera has been based upon the characters. Upon the back of the frond are special organs for propagation, called *sporangia*, or inaccurately fruit dots. These are at first generated under the epidermis, which is separated and borne upward to protect the sporangia. This scale of epidermis becomes the *indusium*. When fully ripe, the indusium falls away and leaves the sporangium more or less exposed. The sporangia assume a great variety of forms, whereby genera are determined. A large number of ferns belong to the sub-order *polypodiaceæ*, of which the rock fern (*polypodium vulgare*, Linn.) may be taken as a familiar type. In this plant we notice rounded, brown or cinnamon-colored dots, situated in rows upon the back of the leaf. On removing the indusium, numerous elastic rings, filled with round, seed-like bodies, will be seen, which are a sort of buds or bulbs from which new plants are to issue. In the *scolopendrium*, instead of rounded dots, the indusium covers numerous obliquely transverse lines of sporangia. In the maiden's hair (*adiantum pedatum*, Linn.), the edge of each leaflet seems to be turned over, and covers the sporangia beneath; and the same arrangement occurs in the brake (*pteris*, Linn.). Such as these are called dorsiferous ferns, in distinction from the adder's tongue (*ophioglossum vulgatum*, Linn.), where the spore cases or sporangia, having two valves, are collected into a spike formed out of the sides of a contracted frond, without any trace of an elastic ring. The spores themselves resemble fine powder, instead of conspicuous seed-like dust. The elastic rings are also wanting in the *danæaceæ* (tropical forms), whose spore cases are sunk within, or rarely seated upon the back of the leaflets. As the increase and normal propagation of the ferns is through these spores, some brief account of the mode will be proper. In some species, it may be remarked, bulbs and even viviparous offsets are produced on the fronds; yet these are exceptional cases. The spore, falling upon

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the surface of the moist earth, develops in a few weeks into a small, tender, cellular, leaf-like organ called the *prothallus* or *proembryo*. This rapidly develops itself, until two distinct, small bodies, which represent the flower, make their appearance in different parts of the surface. After a while one or more of these alter in appearance and size, and tender roots are found to issue from beneath. The proembryo now disappears, leaving only one or more of these points attached by roots to the soil. These are the young forms of the ferns, and are thus germinated and growing buds, having an axis or future stem and roots. From this diminutive bud the fronds spring; and growing rapidly, they help to develop the axis or stem, to multiply the roots, and maintain the life of the plant. In a few years the young plants make strong and efficient organs, and the fronds now having grown to proper size begin to show by the appearance of the indusium that the seed cases are being formed, when the process goes on as before.—The value of the ferns is chiefly medicinal. The leaves generally contain a thick, astringent mucilage with a little aroma, and are considered lenitive and pectoral. Some Peruvian species are said to have solvent, deobstruent, sudorific, and anti-rheumatic properties. Some of the stems or root stocks of ferns are eaten by swine. The aborigines eat the roots of a Tasmanian fern, after roasting it. The common brake (*pteris aquilina*, Linn.) and a species of *aspidium* have been used in making beer, and *A. filix mas* has been employed as a substitute for tea. Some tropical ferns contain a fragrant aroma, used in scenting cocoanut oil. The ferns are all beautiful, and many are of exquisite proportions; and as ornamental plants for the garden or greenhouse, they are unsurpassed; moisture, shade, and a uniform temperature being the chief requisites in their cultivation.

FEROZEPOOR, a district of Sirhind, British India, forming part of the Cis-Sutlej territories, and crossed by the parallel of 30° 45′ N. lat., and the meridian of 75° E. long. Its boundaries, area, and population are imperfectly known, but the last is said to be very scattered. Not more than $\frac{1}{4}$ part of the district is cultivated, and a large proportion of the remainder is totally unproductive; but several ruined towns and villages indicate a former state of prosperity, and it is again rising into importance. It passed into the hands of the East India company in 1835.—FEROZEPOOR, a town and fort of the above district, 8 m. from the left bank of the Sutlej, 79 m. W. from Loodiana, and 1,181 m. N. W. from Calcutta; pop. about 6,000. It is surrounded by a ditch and a weak mud wall, and is a mean, dirty place, but an important military station for the British, who have made many improvements in its appearance. The ruins surrounding it show that it was once a very large town. On May 13, 1857, some companies of the 45th regiment of native infantry revolted here, scaled a dilapidated part of the fort, were joined by the native guard inside, and attempted to seize the magazine. They were driven out by a handful of Europeans, and after burning and plundering the bungalows, mess houses, hospitals, and church, decamped. A European regiment was at the station, posted so badly that it was able to render no service. Two other native regiments were disarmed, one of which (the 10th cavalry) rose on Aug. 19, killed several persons, and attempted to seize the guns, but was repulsed and dispersed.

FERRAND, ANTOINE FRANÇOIS CLAUDE, count, a French politician and historian, born in Paris, July 4, 1751, died there, Jan. 17, 1825. At the age of 18 years he was admitted a counsellor in the parliament of Paris by special dispensation. He left Paris in 1789, and attached himself to the prince of Condé; and after the death of Louis XVI., he was appointed a member of the council of regency. He returned to France in 1801, devoted himself to literature, and published a work, on which he had been long engaged, entitled *De l'esprit de l'histoire*, which was a bold defence of absolute monarchy. The czar of Russia sent the author a flattering letter and a valuable ring. Ferrand was engaged to complete the unfinished "History of the Anarchy in Poland" by Rulhières; but the police prevented the publication on the ground that the work belonged to the government. Ferrand was accused of having changed the manuscript to suit his own ideas. After the restoration of the Bourbons he was appointed minister of state and postmaster-general.

FERRARA, the northernmost province of the Papal States, bounded N. by the main branch of the Po, which divides it from Lombardy, E. by the Adriatic, S. by the provinces of Ravenna and Bologna, and W. by Modena, from which it is partly separated by the river Panaro; area, 823 sq. m.; pop. in 1853, 244,524. The surface is flat, and in many parts below the level of the Po, and protected from inundations by embankments along the river. A considerable portion of the E. part of the province is almost constantly under water. The soil is rich and fertile, but the vast swamps render the atmosphere more or less unwholesome, especially in summer. The chief products are grain, rice, flax, hemp, wine, olives, and silk. Extensive pastures favor the rearing of cattle, and the fisheries are of some importance. The province formerly constituted the greater part of the duchy of Ferrara, which was ruled by the house of Este from the early part of the 13th to the end of the 16th century, when it was annexed to the Papal States. At the end of the 18th century it was taken by the French and formed part first of the Cisalpine republic, and afterward of the kingdom of Italy, until 1814, when it was restored to the pope, with the exception of a small portion between the Po di Goro and the Po della Maestra, which was secured to Austria by the congress of Vienna, together with the right of garrisoning the citadel of Ferrara. The province was governed by a papal legate or

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cardinal, and was called a legation, until Nov. 1850, when it came under the administration of an inferior prelate, and is now a delegation, forming part of the legation of the Romagna, and divided into the districts of Lugo and Ferrara. The principal towns, beside the capital, are Lugo, Cento, Bagnacavallo, and Comacchio, the latter a fortified town lately garrisoned by Austrians, situated on an island in the midst of extensive swamps, and noted for its fisheries, which are celebrated by Tasso and Ariosto.—The capital, FERRARA, is situated in a flat, unhealthy country, only about 7 feet above the level of the sea, on the left bank of the Velano, an arm of the Po, about 5 m. S. from the main channel of that river, 26 m. from Bologna, and 38 m. from Ravenna; pop. in 1856, 32,000, comprising about 2,000 Jews, who are not permitted to reside outside of the ghetto. Ferrara was for a long time only a small village, until about the end of the 6th century, when it was walled by the exarch of Ravenna. The bishopric of Ferrara dates from 661, the archbishopric from 1735. Under the rule of the princes of Este the city gained great importance, especially in the 16th century, when it was one of the cities of Europe most celebrated for learning, poetry, art, and for the refinement and splendor of its ducal court. In the 15th century it was famous for its school of painting. In the early part of the 16th century it gave an asylum to Calvin and other religious reformers. Guarini, Boiardo, Ariosto, and Tasso were among the most illustrious ornaments of the court of Ferrara. The city had in its most prosperous era over 80,000 inhabitants. It still retains many vestiges of its former splendor. The churches contain fine works of art, especially that of the Campo Santo, which occupies the site of the old Certosa convent. The cathedral of St. Paul was consecrated in 1135, and contains the tomb of Urban III. Santa Maria del Vado is the oldest church of Ferrara. That of San Francesco is famous for its echo, which has 16 reverberations. Ariosto was buried in the church of San Benedetto, but in 1801 his remains were removed to the public library. The finest of the palaces of Ferrara are the diamond palace, or Villa Ercole, and the palace *del Magistro*, where the *accademia Ariostea* holds its sittings. In the hospital of Santa Anna a small room on the ground floor is still shown in which Tasso was confined as a lunatic for many years by Alfonso II.; and near Ferrara is the villa *Bel Riguardo*, where the poet paid his court to Eleonora of Este. The university of Ferrara was founded in 1264, renovated in 1402, closed in 1794, and reopened in 1824. It was again closed during the revolutionary troubles of 1848–'9, and reopened Nov. 1, 1850, after the reëstablishment of the papal authority. It is chiefly renowned as a school of jurisprudence and medicine, and is attended by 200 to 300 students. It contains a collection of antiquities, a library of 80,000 volumes and 900 MSS., comprising some of Guarini, Ariosto, and Tasso, and many valuable editions of the 15th and 16th centuries. Ferrara possesses one of the finest and largest theatres of Italy, a botanical garden, and many charitable institutions and convents. In the centre of the city is a castle flanked with towers and surrounded by wet ditches, which was formerly the palace of the dukes of Ferrara, and is now that of the papal delegate. The population is chiefly collected in the vicinity of this castle, and but thinly scattered over the remainder of the town. The city is enclosed with walls and defended on the W. side by the citadel. The Austrians took possession of the whole city in Aug. 1847, but the troops were withdrawn in December following, and the Austrian occupation remained confined to the citadel until July 14, 1848, when the city was seized by the Austrian general, Prince Liechtenstein. On Feb. 18, 1849, it was occupied for a short time by Gen. Haynau, who imposed upon the inhabitants a contribution of 200,000 scudi. In 1859, after the battle of Magenta, the Austrian forces withdrew from the citadel, when they evacuated all the other places they had occupied in the Papal States.

FERRARA, FRANCESCO, an Italian political economist, born in Palermo in Dec. 1810, became in 1834 director of the statistical department of Sicily, and founded the *Giornale di statistica*. Having expressed liberal political opinions, he was imprisoned in 1847, but released in the following year. In 1849 he was appointed professor of political economy at the university of Turin. He still (1859) holds this position, and among other valuable writings he has published *Importanza dell' economia politica* (Turin, 1849–'50). His most important publication is the *Biblioteca dell' economista*, which gives annually biographies of eminent political economists, and selections from important disquisitions on the science. He commenced it in 1850, and 10 volumes of it had appeared in 1858. He is a zealous advocate of free trade principles.

FERRARI, GAUDENZIO, a painter of the Milanese school, born in Valduggia in 1484, died in Milan in 1550. His principal works are illustrative of the story of creation and of the early events of Christianity, and are found in the galleries and churches of Lombardy. He was also a sculptor, architect, mathematician, and poet.

FERRARI, GIUSEPPE, an Italian philosopher and author, born in Milan about 1811. Toward 1831 he was graduated as a doctor of law in the university of Pavia, but devoted himself to literature, and became intimate with the philosopher Romagnosi, of whose views he published in 1835 an interesting account in the *Biblioteca Italiana*. In the same year appeared his complete edition of the works of Vico, reprinted in 1853, in Milan, in the collection of Italian classics. In 1837 he repaired to France, and published in 1839 *Vico et l'Italie* (in French), which gives a succinct account of Vico's influence on the Italian mind, and of the relation between his theories and those of modern philosophers. He also wrote a series of articles on

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popular Italian authors in the *Revue des deux mondes*, which involved him in a controversy with M. Libri. In 1840 he became professor of philosophy at the college of Rochefort, and afterward at Strasbourg, where he took the place of the abbé Bautain. He was vehemently opposed by the Catholic party, who accused him of having advocated communistic theories. But this charge was only founded upon the circumstance that he had translated a passage of Plato on those subjects, and explained it to his pupils. He wrote a pamphlet to vindicate himself (*Idées sur la politique de Platon et d'Aristote*, 1842), but could not regain his professorship. In 1847 he published his *Essai sur le principe et les limites de la philosophie de l'histoire*. After the revolution of Feb. 24, 1848, he was reinstated in his office at Strasbourg, but the dislike of the French clergy followed him there, and to Bourges, whither he removed at the end of 1848, and they eventually succeeded in procuring his dismissal (June 13, 1849). He has written many works in French and in Italian, the most important of which is his *Histoire des révolutions d'Italie, ou Guelfes et Gibelins* (4 vols., Paris, 1856–'58).

FERREIRA, Antonio, the reformer of the national poetry of Portugal, born in Lisbon in 1528, died there of the plague in 1569. He was a contemporary of Camoëns, and perfected the elegiac and epistolary style already introduced with success by Sa de Miranda. He enriched Portuguese poetry with the epithalamium, the epigram, ode, and tragedy, and the influence which he exerted in kindling a love for classical scholarship caused him to be called the Horace of Portugal. His *Poemas Lusitanos*, which are distinguished by remarkable purity of language, appeared in 1598, and his complete works in 1771. His best comedy is *Comedia do Cioso* (the "Jealous Man"), and his masterpiece is the tragedy of *Ines de Castro*. An English translation of this tragedy, by Mr. Musgrave, appeared in 1825.

FERRET, a carnivorous digitigrade animal, belonging to the weasel family, and the genus *putorius* (Cuv.). The dentition is: incisors, $\frac{6}{6}$; canines, $\frac{1}{1}$; molars, $\frac{4}{4}$, 2 above and 3 below being false molars. Since the time of Linnæus the ferret has been generally considered a southern or albino variety of the polecat (*P. fœtidus*, Klein), principally from their producing offspring together; but they may more properly be considered distinct species for the following reasons: the ferret is a native of Africa and warm regions, and only exists in Europe in a domesticated state, being very sensitive to cold, and requiring the protection of man; its size is smaller, its shape more slender, and its snout sharper than in the polecat; and its habits, though quite as sanguinary, do not enable it to live wild in the woods. The length of the ferret (*P. furo*, Linn.) is from 12 to 14 inches from nose to base of tail, the latter being abont 5 inches long. It is an error to suppose that the ferret is always white, with pink eyes, as such individuals are only albino varieties, such as occur in many other animals; the general color is an irregular mixture of yellow and black, the fur being long and fine, with an undergrowth of cinereous woolly hair; the yellowest animals are most subject to albinism. Both sexes are alike in color, but the male is the larger, being about 3 inches high at the shoulder and 4 at the sacrum. Though ranked as a domesticated animal, and employed by man to hunt rabbits and rats, it is far from docile or gentle, and never seems to have any affection for those who feed and take care of it. According to Strabo it was introduced from northern Africa into Spain, whence it has spread over Europe. In its natural condition it has the habits of the polecat and weasels, sucking the blood of small quadrupeds and birds, and devouring eggs; it is nocturnal, sleeping nearly all day; in captivity it is fed on bread and milk and raw meat. It produces young twice a year, and from 5 to 8 at a time; gestation is about 6 weeks, and the young are said by F. Cuvier to be born hairless, and with closed eyes, and to be frequently devoured by the mother. Its natural enmity to the rabbit has been taken advantage of by man, who trains it to enter the burrows of these animals, and to drive them out into nets spread over the entrance; the ferret is muzzled to prevent its killing the rabbits, otherwise it is believed it would suck their blood, and go to sleep in the burrow. It will also soon rid a house of rats and mice. For these reasons the ferret is cared for by man, without whose aid it would not survive in Europe; it is therefore carefully bred in captivity, and sometimes crossed with the polecat, which is supposed to increase its ferocity. The ferret is easily irritated, and then emits a strong disagreeable odor. It is generally believed that the ferrets kill by sucking the blood of their victims, aiming at the jugular vein or the great vessels of the neck; but the rapidity of the death is entirely inconsistent with so long a process as this. Experiments have shown that the ferret often inflicts but a single wound, which is almost instantly fatal, and frequently immediately disengages itself from the body of its victim to attack and kill another in a similar manner; the simple wound is in the side of the neck, under or behind the ear, and may or may not pierce the large blood vessels; the canines enter the spinal cord between the skull and the first vertebra of the neck, destroying its victim by the same process as the bull-fighter with his keen sword, or the Cuban executioner with the steel point of the garrote, making neither a lacerated nor a confused wound, but penetrating into the medulla oblongata, the very centre of life, and instantly arresting the action of the heart and respiratory muscles, and at once destroying consciousness, sensation, and motion. This is one of many instances in which the instinct of animals has anticipated the slow deductions of science. The truth seems to be that when the animal is of small

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size, it is killed by the ferret by wounding the upper part of the spinal cord; but that when it is of superior size and strength, the ferret seizes it wherever it can, producing death by loss of blood, pain, and exhaustion of strength. After the animal is dead, the ferret, like other weasels, no doubt sucks its blood, though the statement generally made in works on natural history, from Buffon to F. Cuvier and Geoffroy St. Hilaire, that the death is uniformly caused in this manner, is certainly untrue.

FERRIER, Mary, a Scottish novelist, born in Edinburgh about 1782, died there in Nov. 1854. Her works, all published anonymously, are: "Marriage" (1818); "The Inheritance" (1824); "Destiny, or the Chief's Daughter" (1831). She possessed a rare ability for delineating national characteristics, genial wit, and a quick sense of the ludicrous. Sir Walter Scott pays a tribute to her talent at the conclusion of his "Legend of Montrose." She was his frequent guest at Abbotsford, and contributed by her society to relieve the sadness which clouded the last days of his life.

FERRO, or Hierro, the most westerly and smallest of the Canary islands, in lat. 27° 40′ N., long. 18° W.; length, 18 m.; breadth, 9 m.; area, 100 sq. m.; pop. 4,337. The ancient geographers supposed this to be the westernmost point of the world, and drew through it their first meridian, as is still done by German geographers, and others of eastern Europe who follow them. Chief town, Valverde.

FERROL, a seaport city of Spain, on the N. arm of the bay of Betanzos, in the province and 12 m. N. E. of the city of Corunna; pop. 14,286. Its harbor is one of the best in Europe. The town is well built, and protected on the land side by formidable fortifications. It has an immense marine arsenal, covering nearly 24 acres, with a basin and docks, which are among the most magnificent in Europe, but are decaying. The marine barracks afford accommodation for 6,000 men. Ferrol has a few manufactures, but being a military port, foreign merchant vessels are excluded from it. It was but a small fishing town prior to 1752, when its fortifications were begun by Ferdinand VI. The English failed in an attack upon it in 1799, but it was taken by the French in 1809 and 1823.

FERRY may be defined as a place where persons, animals, or goods are carried across a river or other water; but the more technical common law definition is a liberty or franchise so to transport persons or things. It can exist in England only by grant from the king, or by a prescription which supposes a grant; and being granted and accepted, the grantee is indictable if he have not suitable means of transport. In the United States, ferries are created as well as regulated generally by statutes, although there may be ancient ferries resting on usage and prescription. The termini of the ferry are at the water's edge, and shift with that if it varies; but the owner has a right of way to and from the ferry. Ferrymen are common carriers, and have the rights and come under the obligations of common carriers. Thus, they may determine (within reasonable limits) when and how often, and upon what terms, their boats shall cross the water, and what they will transport; but all these things they must do by general rules, without favoritism or arbitrary exception. They are liable for all loss of or injury to property in their possession, unless it be caused by the act of God or of the public enemy. But this liability does not attach when persons or things are coming toward or going from their boats, but begins as soon as they are on the boat, or on the slip or flat, and continues while they are there. One who owns a ferry, and employs persons to do all the labor and the actual transport, is in law the ferryman, and liable accordingly. But if he leases the ferry, reserving only his rent, the lessee in possession, and not the owner, is the responsible ferryman; and this is true even if the rent reserved be a certain proportion of the receipts.

FERSEN, Axel, count, born in Stockholm in 1755, killed June 20, 1810. He was educated chiefly at the military academy of Turin, and entered the Swedish military service, but afterward repaired to Versailles, and was made colonel of the royal regiment of Swedes, a famous body-guard of Louis XVI. He served in the American revolutionary war with distinction, and was aide-de-camp of Rochambeau at Yorktown. We find his portrait in a group of officers in Trumbull's picture of the surrender of Cornwallis, in the rotunda of the capitol at Washington; and it appears that he received the badge of the Cincinnati from the hands of Washington. Upon his return to France he became a devoted adherent of the Bourbons. Marie Antoinette especially distinguished him, and scandal was not slow to attribute her favor to improper motives. In the memorable flight to Varennes, Fersen was the disguised coachman of the royal fugitives. After their capture he escaped to Prague, and was employed by Gustavus III. in furthering the project of reinstating the Bourbon dynasty in France. He became the favorite of Charles XIII., and his sister enjoyed in an equal degree the favor of the queen; but both were unpopular with the people. Fersen was made grand marshal of the kingdom; but the sudden death of the crown prince, Christian Augustus of Augustenburg, gave rise to suspicion that Fersen had poisoned him. A tumult occurred at the funeral, and while the troops looked on with indifference, the mob slowly tortured Fersen to death in the great square of the Riddarhus in Stockholm. The sister, disguised as a Dalecarlian girl, escaped after great peril across the Baltic. There appears to be no probability that Fersen was implicated in the death of the prince; but the event is enveloped in profound mystery.

FESCENNINE VERSES, licentious poems sung at the private festivals of the ancient Ro-

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mans, particularly at nuptial celebrations. They derived their name and origin from Fescennium, an Etruscan city, where they seem to have been a rude dramatic entertainment improvised in the intoxication of rustic festivals. They were composed with the most unbounded license, accompanied with uncouth posturing and dances, and gave delight to the yet savage and untaught Romans. The later satire and comedy took its origin from them, and Catullus introduced them into his epithalamia; but in attaining a better literary character these verses hardly improved their morals.

FESCH, Joseph, cardinal, and archbishop of Lyons, born in Ajaccio, Corsica, Jan. 3, 1763, died in Rome, May 13, 1839. He was the son of a Swiss officer in the Genoese service, and half-brother of Letizia Ramolino, the mother of Napoleon Bonaparte. After pursuing his studies at Aix, in Provence, he received holy orders, and was archdeacon of the chapter of Ajaccio when the chapters were suppressed by the revolution of 1789. In 1793 he was exiled from Corsica with the Bonaparte family, and being without resources renounced his ecclesiastical habit and was appointed commissary of war to the army of Italy, of which his nephew Napoleon held command. He resumed his ecclesiastical functions when the first consul determined to reëstablish in France the Catholic worship, and was active in the negotiations between Napoleon and Pius VII. which prepared for the concordat of July 15, 1801. The influence of his nephew raised him to the archbishopric of Lyons in 1802, and obtained a cardinal's hat for him in 1803. As ambassador of France at Rome in 1804, after conducting the negotiations, he accompanied Pius VII. on his way to Paris to crown the emperor. Many civil dignities and emoluments were subsequently conferred upon him, but in 1809 he declined the archbishopric of Paris, to which Napoleon, wishing to make some one of his family the head of the French clergy, nominated him. He was president of the council which sat in Paris in 1810, and also of the national council of 1811, called to consider the disagreement between Napoleon and the holy see concerning the nomination of bishops. In this capacity he did not satisfy the emperor, and for a time he disappeared from court; and he afterward adhered to the pope, greatly to the displeasure of his nephew. Upon the fall of Napoleon he retired to Rome, but was recalled to Paris during the Hundred Days. After the battle of Waterloo he lived in retirement in Rome. His collection of paintings, one of the largest ever brought together by a single person, was dispersed after his death.

FESSENDEN, Thomas Green, an American author and journalist, born in Walpole, N. H., April 22, 1771, died in Boston, Nov. 11, 1837. He was graduated at Dartmouth college in 1796, and studied law in Vermont, employing his leisure hours in writing humorous poems for the Walpole "Farmer's Weekly Museum," then edited by Joseph Dennie, and other papers. One of his poems, "The Country Lovers," was very popular in New England. In 1801 he went to England as the agent for a newly invented machine, the failure of which to answer its purpose involved him in pecuniary difficulties. Obliged to resort to his pen for a subsistence, he produced in 1803 a poem in the Hudibrastic vein, entitled "Terrible Tractoration," in which the metallic tractors of Perkins are advertised, and the medical profession in general is satirized. It was successful in London, where it was published anonymously, and was attributed to Wolcott, Gifford, and others. It was republished in New York in 1804, and again in 1806 in an enlarged form, under the title of the "Minute Philosopher." A third edition appeared toward the close of the author's life. Mr. Fessenden returned to America in 1804, settled in Boston, and in 1822 commenced the publication of the "New England Farmer," with which he remained connected during the remainder of his life. He also edited the "Horticultural Register" and the "Silk Manual," and contributed articles on agriculture and horticulture to a variety of journals. His remaining works are "Original Poems," published in England and America, "Democracy Unveiled" (1806), "American Clerk's Companion" (1815), and "Laws of Patents for new Inventions" (1822).

FESSENDEN, William Pitt, a U. S. senator from Maine, son of the Hon. Samuel Fessenden, born in Boscawen, Merrimack co., N. H., Oct. 16, 1806. He was graduated at Bowdoin college in 1823, studied law, was admitted to the bar in 1827, opened an office in Bridgton, Cumberland co., Me., and in 1829 removed to Portland. In 1831 he was elected to the state legislature, and though the youngest member, he rose at once to distinction in that body, both as a debater and a legislator. In a debate on the U. S. bank the youthful orator displayed remarkable spirit and ability. From 1832 to 1839 Mr. Fessenden devoted himself exclusively to his profession, in which he very soon rose to the first rank both as a counsellor and advocate. In 1838 he was solicited to become a candidate for congress, but declined. In 1839 he was again chosen to the legislature from Portland. The house was largely democratic. Mr. Fessenden was placed on the judiciary committee, and though a whig from the first, and always distinguished for uncompromising assertion of his principles, he was made chairman of the house committee to revise the statutes of the state. In 1840 he was nominated by acclamation as the whig candidate for congress, and was elected, outrunning the strength of his party. In congress he participated in the current debates, and made speeches on the loan bill, bankrupt act, army appropriation bill, against the repeal of the bankrupt law, and in reply to Caleb Cushing on Mr. C.'s personal position. He was nominated for reëlection in 1843, but declined, preferring to return to the practice of his profession. Meantime he receiv-

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ed in the legislature of that year the votes of the whig party for a vacant seat in the U. S. senate. In 1845 he was again induced, by considerations growing out of the position of parties on the temperance question, to become a candidate for the state legislature, to which he was chosen, as also in the succeeding year, when he declined to serve further. While a member in 1845 he again received the votes of the whigs of the legislature for a seat in the U. S. senate. From 1845 to 1852 he was in private life, devoting himself to his profession with a constantly extending practice and reputation. During this period he was associated with Daniel Webster in an important case before the supreme court at Washington, involving a legal question never before discussed in that court, viz.: how far the fraudulent acts of an auctioneer in selling property should affect the owner of the property sold, he being no party to the fraud. Mr. Fessenden had to contend against the weight and influence of Judge Story's opinion and decision against his client in the court below. He was successful, and Judge Story's decision was reversed. Mr. Fessenden's argument on that occasion was remarkable for its logical force and legal acuteness, and won the highest admiration from the most fastidious judges. Once during the period (in 1850) Mr. Fessenden was elected to congress, but his seat was given to his competitor through an error in the returns. Mr. Fessenden declined to contest the case before congress from an unwillingness to serve in that body, which he had decisively expressed in advance to the conventions of the whig and freesoil parties, which, against his wishes, had insisted upon nominating him. He was elected a member of the national convention which nominated Gen. Harrison for the presidency in 1840; was a member of the convention of 1848 which nominated Gen. Taylor, in which he supported the claims of Mr. Webster; and a member of the convention of 1852, which nominated Gen. Scott. He was opposed to Mr. Webster on the last occasion, and advocated Gen. Scott's nomination, but was one of the 67 who opposed and voted against the platform at that time set up by the whig party. In 1853 he was again returned as member of the state legislature from Portland, and was chosen by one branch (the senate) as U. S. senator. The democrats had a majority in the house, and that branch failed to concur in the election by 4 votes; a concurrent vote being requisite to a choice, no election of senator was effected at that session. The same house, though opposed to Mr. Fessenden in politics, associated him with the Hon. Reuel Williams in negotiating the purchase of the large body of wild lands of Massachusetts lying in Maine, which was successfully accomplished. In the succeeding year (1854) Mr. Fessenden was again a member of the legislature, which was democratic in both branches. The Kansas-Nebraska question operating as a disturbing element, Mr. Fessenden was now chosen senator by both branches on the first ballot by a union of the whigs and freesoil democrats. Though he declined to be elected except as a whig, this event may be said to have been the preliminary step toward establishing the republican party in Maine, the necessity of which new organization, after the action of the main body of the southern whigs on the Nebraska bill, Mr. Fessenden was one of the first to proclaim and advocate. He took his seat in the senate, Feb. 23, 1854, and on the night of March 3 following, at which time the bill was passed, delivered one of the most electric and effective speeches made against it. This effort established his reputation at once as one of the ablest members of the senate. Of his subsequent speeches in the senate the most important are on a bill to protect U. S. officers (1855); on our relations with England, on Kansas affairs, on the president's message (1856); on the Iowa senatorial election (1857); and on the Lecompton constitution (1858). Mr. Fessenden has also taken a prominent part in the general debates and business of the senate, being a leading member of the finance committee. He was reëlected as U. S. senator for 6 years in 1859, by a unanimous vote of his party in the legislature, without the formality of a previous nomination, it being the first instance of the kind in the history of the state.

FETH ALI SHÁH, called before his accession BABA KHAN, second king of Persia of the Turcoman dynasty of the Kadjars, born about 1762, succeeded in 1797 his uncle Aga Mohammed, died in 1834. In 1803 war broke out between Persia and Russia for the possession of Georgia, whose ruler had transferred his allegiance from the former to the latter power. In 1805 Napoleon offered Feth Ali his alliance and protection in the prosecution of the war, and in 1807 sent Gen. Gardanne as ambassador to Persia. The treaty of Tilsit having, however, put an end to hostilities between France and Russia, the Persian king abandoned the French alliance for that of the English; but he was obliged in 1813 by the successes of the Russians to yield Georgia to the czar by treaty. In 1821 a war broke out between Persia and the Ottoman empire on account of the extortions and oppressions practised by Turkish functionaries upon Persian pilgrims, and was terminated in 1823 by a treaty favorable to Persia. In 1825 Feth Ali, thinking to profit by the death of the czar Alexander, and to reconquer Georgia, declared war against the Russians; but his army was vanquished by Gen. Paskevitch, and he was forced in 1828 to abandon Persian Armenia to Russia, and to make the Aras the boundary of his dominions. He amused himself in his leisure with writing verses, and left a collection of odes and songs.

FETIALES, or FECIALES, in ancient Rome, a college of priests, consisting of 20 members belonging to the noblest families, who held office for life, with power to fill vacancies in their number, and whose duty it was to carry the complaints and grievances of the Roman people before the magistrates and rulers of offending cities and tribes, to ask redress, to declare in case

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of refusal whether there was sufficient reason for hostilities, to perform the religious rites of warning the enemy, of declaration of war, and of ratification of peace, and to watch over the strict observance of treaties. This institution is believed to have existed among the people of Etruria. Its introduction at Rome is attributed by some to Numa, by others to Ancus Martius. When the policy of Rome became that of continual conquest, the institution lost its influence, preserving only its religious character. The term is variously derived from the Latin words *fidus*, *fœdus*, *ferio*, and *facio*, and the Greek φημι.

FETICHISM, or FETISHISM (Nigritian *feitico*, a magic thing, from which the Portuguese have derived *feitiçio*, magic), the religious worship of material things (fetiches) as the abodes of spirits. It is the lowest of the unsystematic forms of worship found among uncivilized tribes, and exists especially among the negroes in Africa. There are two kinds of fetiches, natural and artificial. Among the former are celebrated rocks, particularly high mountain peaks where the lightning is supposed to dwell; single trees, and more frequently whole forests; many animals, as serpents, one of which has its own temple, where the snakes are kept by priestesses; snails, crocodiles (with the Ashantees), goats, sheep, &c. Usefulness and hurtfulness seem to have often dictated their selection, but not always. Artificial fetiches are either public, preserved by priests, or private, purchasable from them usually at a very high price. Kings and princes have large collections of fetiches, and every family has at least one. They are hereditary, and either hung up in the dwellings or worn on the neck or elsewhere, and are even fastened on domestic animals. They are made to resemble the human form, and the public fetiches are sometimes of gold and very large. The worshippers provide their fetiches liberally with food, but if their prayers are not granted they frequently maltreat them, throw them away, or beat them to pieces. They have also festivals and sacrifices. For the latter the victims are oxen, swine, and other animals; but sometimes, when the royal and priestly power are united in the sacrificer, criminals, prisoners, or persons of the lowest classes of the tribe are immolated. The festivals—among which the Yam and Adai festival with the Ashantees, and the festival in honor of Khimavong, the god or divine messenger, are especially celebrated—are generally attended by excess in drinking, thefts, fights, and gross licentiousness. The priests form a separate society, with hereditary dignity, property, and privileges. They have in particular the right of retaining the slaves who come to them, or, as they call it, present their bodies to the fetich.—See De Brosses, *Du culte des dieux fétiches* (Dijon, 1760), through whom the terms fetich and fetichism were introduced into the history of religious worship. It must, however, be observed that the limits of the term fetichism have not yet been agreed upon, as some exclude from it the worship of forests, mountains, rivers, &c.

FÉTIS, FRANÇOIS JOSEPH, a Belgian composer and writer on music, born March 25, 1784, in Mons, where his father was organist. He was intended for his father's profession, and at the age of 10 years he was able to undertake an engagement as organist in his native town. After taking lessons from the most eminent teachers in Paris, among whom was Boieldieu, he travelled in Germany and Italy, and made himself familiar with the works of the great masters of those countries. He returned to Paris in 1806, married a rich woman, and devoted himself to a profound study of the history of music, especially of that of the middle ages. In 1811, a reverse of fortune obliging him to return to the practice of his profession, he took the position of organist and teacher of music at Douay, and in 1818 was appointed professor in the conservatory of Paris. In 1827 he founded the first journal of musical criticism that had appeared in France, entitled the *Revue musicale*, which was continued till 1835. At the same time he was pursuing his researches upon the theory of harmony, writing articles for various periodicals, and volumes upon the history and curiosities of music, and composing operas and pieces of sacred music. In 1832 he began his historical concerts, which have since found imitators in Germany and England. In 1833 the king of Belgium appointed him chapel master and director of the royal conservatory of Brussels, which offices he still holds. His most successful opera was *La vieille*, but his musical compositions have been less favorably received than his works on the history of the art. Among the most important of the latter was *Biographie universelle des musiciens, et bibliographie générale de la musique*, preceded by an epitome of the history of music (8 vols., Brussels, 1835–'44). Among his more recent writings are *Traité complet de la théorie et de la pratique de l'harmonie, contenant la doctrine de la science et de l'art* (Paris, 1853), and a sketch of Meyerbeer in the *Revue contemporaine* (Paris, 1859).

FEUCHÈRES, SOPHIE DE, baroness, mistress of the last prince of Condé (Louis Henri Joseph, duke of Bourbon), born in the isle of Wight about 1795, died in England, Jan. 2, 1841. She was the daughter of a fisherman named Clarke, represented herself as the widow of a Mr. Dawes, and is believed to have been for some time an actress; but the accounts of her life are conflicting until about 1817, when she became the mistress of the prince of Condé. At his instigation she married in 1818 the baron Adolphe de Feuchères, who became a member of his household, on which occasion the prince settled upon her 72,000 francs per annum. In 1822 she was divorced from the baron. She exercised over the weak mind of Condé an almost unbounded influence. In 1824 he presented her with the domains of Boissy and St. Leu, and in 1825 with 1,000,000 francs, beside leaving her 2,000,000 by his will, dated Aug. 30, 1829. A year afterward (Aug. 27, 1830) the prince was found dead in his room, under circumstances which

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fixed the suspicions of his relatives upon the baroness, and also upon Louis Philippe; for in order to ingratiate herself with the Orleans family she is said to have prevailed upon the prince to bequeath the bulk of his large fortune to his godson, the duke of Aumale, a disposition which just before his death he seemed inclined to revoke in favor of the count of Chambord. His relatives accused her of having murdered the prince, and insisted upon a judicial investigation; but nothing could be proved against her, and the prince's death was ascribed to snicide. The attempts of the prince's relatives to break the will were equally fruitless; but public opinion was against the baroness, and the trial created a great sensation. (See *Histoire complète du procès relatif à la mort et au testament du duc de Bourbon*, Paris, 1832.) She left her immense fortune to her niece, Mlle. Sophie Tanceron. The baron de Feuchères gave to the hospitals of Paris the whole amount of his share in the property of his former wife.

FEUDAL SYSTEM, the name given to the condition of society that prevailed throughout the greater part of Europe during the middle ages. Of its origin little is known, and learned men have differed largely on the subject, because they have inquired into its history under the idea that it was from the first a system, whereas it was long in coming to maturity. Many of its conditions existed for several centuries in Europe anterior to its establishment there. Its germs were probably Asiatic, and in Asia it has outlasted the system established in Europe, though in that quarter of the world it never was so fully developed as it came to be in the western nations. The countries in which it had the firmest existence were France, Germany, Aragon, a large part of Italy, England after the conquest, and Scotland. Other European countries were more or less influenced by it, but in them it never had the hold which it obtained in those we have named. The cause why the system was so little developed in Castile is explained by Prescott. "The nobles," he says, "embarked with their sovereign in the same common enterprise of rescuing their ancient patrimony from its invaders, felt entitled to divide with him the spoils of victory. Issuing forth at the head of their own retainers, from their strongholds or castles, they were continually enlarging the circuit of their territories, with no other assistance than that of their own good swords. This independent mode of effecting their conquests would appear unfavorable to the introduction of the feudal system, which, although its existence in Castile is clearly ascertained, by positive law, as well as usage, never prevailed to anything like the same extent as it did in the sister kingdom of Aragon, and other parts of Europe." The system grew up in Europe from the 5th to the 9th century, and was the consequence of that struggle against barbarism and for civilization in which men are constantly engaged. It had, like all systems that have lived for any great length of time, a progressive formation. "No great fact," says M. Guizot, writing on this subject, "no social state, makes its appearance complete and at once; it is formed slowly, successively; it is the result of a multitude of different facts, of different dates and origins, which modify and combine themselves in a thousand ways before constituting a whole, presenting itself in a clear and systematic form, receiving a special name, and standing through a long life." So it was with the feudal system, which emerged into life after several centuries of barbarism. The struggle out of which it grew began with the fall of the imperial authority in so many parts of the Roman empire; and when feudalism had established itself, the way had been prepared for a far greater advance toward the establishment of civilization. In France, feudalism was brought into a rude but intelligible form in the 10th century, and "the feudal period" is held to synchronize with the 10 generations during which the throne of that country was held by the elder branch of the Capet family, that is to say, from the accession of Hugh Capet to the death of Charles the Fair, 987–1328. For some generations previous to the extinction of the Carlovingian dynasty it had had a rude existence, and many of its incidents are traceable in legislation to the reign of Charlemagne, throughout the limits of whose vast dominion feudalism had at a later period its fullest continental development. "The regular machinery and systematic establishment of feuds, in fact," says Hallam, "may be considered as almost confined to the dominions of Charlemagne, and to those countries which afterward derived from them." It is not, however, until a much later period that we find "the feudal period" clearly established. As the object of the great monarchs of the Carlovingian line was the establishment of a consolidated empire, it can scarcely be held that they deliberately sought to develop a system the very essence of which was the disintegration of every country in which it existed. As has been justly said: "The peculiar general character of feudalism is the dismemberment of the people and of power into a multitude of petty nations and petty sovereigns; the absence of any useful nation, of any central government." The imbecility of the later kings of the second race favored the advance of feudalism in France; and in that country it was known earlier than anywhere else, and there it received its essential peculiarities. At the time of the conquest of Gaul, and the rise of the Merovingians, there were many freeholds, that is, independent properties, but in the course of the 5 following centuries most of these had disappeared. The beneficiary condition became the common condition of territorial property. Benefice and fief are words that express the same facts at different dates. In the middle of the 12th century *feodum* and *beneficium* were used indifferently, as they had been used for some time previously to that date. The exact na-

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ture of benefices has been the source of considerable dispute, but the better opinion is, that their ordinary duration was the life of the possessor, after which they reverted to the fisc; yet there were instances of hereditary benefices as early as the Merovingian times. The tendency to retain property in their families would lead men to make use of a variety of means to render what they held hereditary, while the weakness of the kings would not enable them to resist claims powerfully urged in behalf of the sons of beneficiaries. "A natural consequence of hereditary benefices," says Hallam, "was that those who possessed them carved out portions to be held of themselves by a similar tenure. Abundant proofs of this custom, best known by the name of subinfeudation, occur even in the capitularies of Pepin and Charlemagne. At a later period it became universal; and what had begun perhaps through ambition or pride was at last dictated by necessity. In that dissolution of all law which ensued after the death of Charlemagne, the powerful leaders, constantly engaged in domestic warfare, placed their chief dependency upon men whom they attached by gratitude, and bound by strong conditions. The oath of fidelity which they had taken, the homage which they had paid to the sovereign, they exacted from their own vassals. To render military service became the essential obligation which the tenant of a benefice undertook; and out of those ancient grants, now become for the most part hereditary, there grew up in the 10th century, both in name and reality, the system of feudal tenures." A marked distinction between the hereditary right to the benefice and the right of fiefs was this: "Whenever the beneficiary or the giver died, the possessor of the benefice thought it necessary that he should be confirmed in his possession; so strongly was the primitive idea of the personality of this relation and the right which resulted from it engraved upon their minds. At the end of the 10th century, when we enter truly into the feudal period, we no longer find any thing of the kind; the right of fiefs, inheritance, is no longer called into doubt by any one, it has no longer any need of confirmation." Under the feudal system the territorial element was known as the fief, and it has been argued that this did not mean originally the land itself, but only the tenure thereof, its relation of dependence toward the suzerain; but the weight of authority is adverse to this view, though it is admitted that at a later period there may have been some such distinction made. Whether *feodum* is of Latin or German origin is not distinctly settled, but the German claim is best supported. The titles, or most of them, which became so identified with feudalism, were not originally hereditary, but were made so gradually, like the property possessions which rendered the great vassals so powerful. Dukes, counts, and marquises, or margraves, were at first provincial governors, officers intrusted with certain specific duties, the margraves being charged with the custody of the frontiers. The weakness of the Merovingian kings caused those officers to become very important persons in the state. The Carlovingians sought to lessen their power, and with some success so long as that race produced able kings; but under Charlemagne's successors the counts rapidly acquired influence and wealth, and political station. The same man was allowed to enjoy several counties, in all of which he endeavored to acquire landed property, and to assume a right to his dignities. In the last quarter of the 9th century the succession of a son to a father's county was a recognized usage; and "in the next century there followed an entire prostration of the royal authority, and the counts usurped their governments as little sovereignties, with the domains and all regalian rights, subject only to the feudal superiority of the king. They now added the name of the county to their own, and their wives took the appellation of countess. In Italy, the independence of the dukes was still more complete; and although Otho the Great and his descendants kept a stricter rein over those of Germany, yet we find the great fiefs of their empire, throughout the 10th century, granted almost invariably to the male and even female heirs of the last possessor." Thus the hereditary principle was recognized in a double respect—as related to the possession of land, and as related to the possession of political power. The counts became the enemies of the allodial proprietors, whose importance was derived from a system entirely unlike that upon which their consequence rested. The allodialists, or independent proprietors, had no protection. The king and the law could not prevent them from being spoiled by their enemies. Many of them surrendered their lands, and received them back upon feudal conditions; or they acknowledged themselves vassals of a suzerain. Yet the allodial lands were not entirely extinguished. They were common in the south of France, the strength of the feudal tenures being between the Somme and the Loire. According to the old French law, allodial lands were always noble, like fiefs, down to 1580. In the German empire many estates continued to be held by allodial tenures. This part of the subject, however, is involved in considerable obscurity, for in the royal charters of the 10th and 11th centuries the word *allodium* is continually used for a feud, or hereditary benefice.—Hallam notices the custom of "commendation," concerning which other writers are silent. "Several passages in ancient laws and instruments," he says, "concur to prove, that beside the relation established between lord and vassal by beneficiary grants, there was another species more personal, and more closely resembling that of patron and client in the Roman republic. This was usually called commendation, and appears to have been founded on two very general principles, both of which the distracted state of society inculcated. The weak needed the protection of the powerful; and the government needed some security for public order. Even before the invasion of the

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Franks, Salvian, a writer of the 5th century, mentions the custom of obtaining the protection of the great by money, and blames their rapacity, though he allows the natural reasonableness of the practice. The disadvantageous condition of the less powerful freemen, which ended in the servitude of one part, and in the feudal vassalage of another, led such as fortunately still preserved their allodial property to insure its defence by a stipulated payment of money. Such payments may be traced in extant charters, chiefly indeed of monasteries. In the case of private persons, it may be presumed that this voluntary contract was frequently changed by the stronger party into a perfect feudal dependence. From this, however, as I imagine, it probably differed, in being capable of dissolution at the inferior's pleasure, without incurring a forfeiture, as well as having no relation to land. Homage, however, seems to have been incident to commendation, as well as to vassalage. Military service was sometimes the condition of this engagement. It was the law of France, so late at least as the commencement of the third race of kings, that no man could take a part in private wars except in defence of his own lord. This we learn from a historian about the end of the 10th century, who relates that one Erminfrid, having been released from his homage to Count Burchard, on ceding the fief he had held of him to a monastery, renewed the ceremony on a war breaking out between Burchard and another nobleman, wherein he was desirous to give assistance; since, the author observes, it is not, nor has been the practice in France, for any man to be concerned in war, except in the presence or by the command of his lord. Indeed, there is reason to infer, from the capitularies of Charles the Bald, that every man was bound to attach himself to some lord, though it was the privilege of a freeman to choose his own superior. And this is strongly supported by the analogy of our Anglo-Saxon laws, where it is frequently repeated, that no man should continue without a lord. There are, too, as it seems to me, a great number of passages in Domesday book which confirm this distinction between personal commendation and the beneficiary tenure of land. Perhaps I may be thought to dwell too prolixly on this obscure custom; but as it tends to illustrate those mutual relations of lord and vassal which supplied the place of regular government in the polity of Europe, and has seldom or never been explicitly noticed, its introduction seemed not improper."—By the edict of Milan, issued by Conrad II., emperor of Germany (1037), 4 regulations are established: "that no man should be deprived of his fief, whether held of the emperor or a mesne lord, but by the laws of the empire, and the judgment of his peers; that from such judgment an immediate vassal might appeal to his sovereign; that fiefs should be inherited by sons and their children, or in their failure, by brothers, provided they were *feuda paterna*, such as had descended from the father; and that the lord should not alienate the fief of his vassal without his consent." This edict, though relating immediately only to Lombardy, is thought to mark the full maturity of the feudal system, and the last stage of its progress. Its object was to put an end to disagreements between inferior vassals and their immediate lords, which had been caused by the want of settled usage. Guizot is of opinion that the essential facts, the constituent elements of the feudal system, may be reduced to three, viz: 1, the particular nature of territorial property, real, full, hereditary, and yet derived from a superior, imposing certain personal obligations on its possessor, under pain of forfeiture; in a word, wanting in that complete independence which is now its characteristic; 2, the amalgamation of sovereignty with property, the attribution to the proprietor of the soil, over all the inhabitants of that soil, of the whole or nearly the whole of those rights which constitute what we now call sovereignty, and which are now possessed only by government, the public power; 3, the hierarchical system of legislative, judicial, and military institutions, which united the possessors of fiefs among themselves, and formed them into a general society. These, he thinks, are the truly essential and constitutive facts of feudalism, containing all the others, though it would be easy to resolve it into a larger number of elements, and to assign to it a greater number of characteristics. Of property we have already spoken. Of feudal relations, support and fidelity were the principal. The vassal owed service to his lord, and the lord protection to his vassal. If the vassal failed in his obligation, his land was forfeited; if the lord failed, he lost his seigniory. It is disputed whether the vassal was bound to follow his lord's standard against his own kindred. As respected the king, the relations were loose and shifting. There are instances of vassals aiding their immediate superiors against the king; and the royal power was always in antagonism to the feudal system.—The ceremonies followed when a fief was conferred were principally homage, fealty, and investiture. The first expressed the submission and devotedness of the vassal toward his lord. The oath of fealty differed little in language from the act of homage, but was indispensable, was taken by ecclesiastics, but not by minors, and could be received by proxy. Investiture was the actual conveyance of feudal lands, and was proper or improper. By the first, the vassal was put in possession upon the ground, by the lord or his deputy, which the English law calls livery of seisin; by the second, possession was given symbolically, by the delivery of a branch, turf, or stone, or some other natural object, according to custom. Nearly a hundred varieties of investiture are mentioned. The vassal's duties commenced with his investiture. These were very numerous, and it is impossible to define them at large. They embraced nearly every obligation that can exist in such a state of soci-

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ety as then prevailed over most of Christendom. They varied, too, with place and time. Military service depended upon circumstances, though 40 days was the usual term that the tenant of a knight's fee was bound to be in the field at his own expense. Among the feudal incidents advantageous to the lord were reliefs, fines upon alienation, escheats, aid, wardship, and marriage, the two latter placing the wards and orphan minors among his vassals almost entirely at his mercy. The control of female vassals was carried to its utmost extent in the Latin kingdom of Jerusalem, founded by the first crusaders at the time when the feudal system was at its height. Improper fiefs, as they were called to distinguish them from the military fiefs, were to time granted, in order to gratify pride, or to raise money. "They were granted for a price, and without reference to military service. The language of the feudal law was applied by a kind of metaphor to almost every transfer of property. Hence, pensions of money, and allowances of provisions, however remote from right notions of a fief, were sometimes granted under that name; and even where land was the subject of the donation, its conditions were often lucrative, often honorary, and sometimes ludicrous." Fiefs of office, too, were granted, by which persons received grants of land on condition of performing some domestic service to the lord. The mechanic arts were carried on in the houses of the great by persons receiving lands upon those conditions.—The feudal system was exclusive in its spirit. In strictness, a person not noble by birth could not possess a fief, though, as with all general principles, there were occasional exceptions to this rule, which increased as the aristocratical spirit declined. Three descents were necessary to remove fully the stain of ignoble blood. Children born of an ignoble mother, in lawful wedlock, were looked upon as of illegitimate origin. The higher clergy, as prelates and abbots, were feudal nobles. Ecclesiastical tenants came within the scope of feudal duty. Below the gentle classes were the freemen and the serfs. The former were dwellers in chartered towns, and were destined to have an important part in destroying the feudal system; and in England, the yeomanry, to whose existence that country owed its leading place in the military system of Europe, were also among the freemen. The serfs, or villeins, were among the most abject of mankind, and were hated and maltreated because they had been injured. In some countries there was a distinction made between villeins and serfs, the latter being compelled to the performance of the vilest labors, and thoroughly enslaved, while the condition of the former was not so harsh, their payments and duties being defined. "The third estate of man," says Beaumanoir, "is that of such as are not free; and these are not all of one condition, for some are so subject to their lord that he may take all they have, alive or dead, and imprison him, whenever he pleases, being accountable to none but God; while others are treated more gently, from whom the lord can take nothing but customary payments, though at their death all they have escheats to him." Probably at no time in the world's history were the mass of the people so badly treated as during the existence of the feudal system; and many of those customs and opinions that still impede the growth of the people in knowledge and happiness in several countries, are but relics of that system, and yet continue to do its work.—There were several causes for the decline and fall of feudalism. The two extremes of society were alike interested in its destruction, and continually sought it: the king, feebly grasping a sceptre that was not an emblem of power, but scarcely more than a fool's bauble; and the squalid people, who were treated by the ruling classes with less consideration than they bestowed upon beasts of chase. The growth of the institution of chivalry, which was one of the children of feudalism, was injurious to the system whence it sprung. The feudal system had much to do with the crusades, and it was probably the only state of society in which those expeditions could either have been undertaken, or have been renewed from time to time during nearly 200 years; yet they worked most injuriously to it, and helped to prepare the way for its fall. The growth of the towns, the increase of commerce, the development of the commercial spirit, the acquisition of military knowledge by the people in several countries, scientific inventions and discoveries, and the application of gunpowder to the uses of war, were among the causes of the downfall of the system. Its chief seat was France, and in that country it failed utterly as a bulwark against the English invasions of the 14th century, which rapidly accelerated its fate. It might have remained powerful during the first century of the Valois kings had it not proved totally unequal to the business it claimed to be peculiarly its own, that, namely, of defending the soil its members owned, and the country they governed. Crécy and Poitiers were blessings to France, and the *Jacquerie* as well, for they led to changes that were incompatible with the existence of political feudalism. —See Sismondi, *Histoire des Français* (Paris, 1821–'43); Guizot, *Histoire de la civilisation en France* (Paris, 1830); Michelet, *Histoire de France* (Paris, 1833–'57); Hallam, "Europe during the Middle Ages" (London, 1818); Bell, "Historical Studies of Feudalism" (London, 1852).

FEUERBACH, Paul Joseph Anselm, chevalier, a German jurist, born in Frankfort-on-the-Main, Nov. 4, 1775, died May 29, 1833. He studied law at Jena, where he became a professor of the university in 1801, and afterward lectured at Kiel and Landshut. From 1808 to 1813 he was assistant secretary of justice and privy councillor in Bavaria. He lost this place in consequence of his liberal opinions, and was appointed chief justice of the supreme court at Anspach. While there he interested himself in the mysterious circumstances surrounding the fate of the unhappy Caspar Hauser, and attempted to probe

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the mystery without much regard to the sovereign families which were thought to be compromised in the matter. Feuerbach was the author of a code of criminal law for the kingdom of Bavaria, and of many standard law books. Of these, the *Lehrbuch des gemeinen in Deutschland gültigen peinlichen Rechts* (1801) is to the present day one of the highest authorities on the subject of criminal law in Germany.—Ludwig, son of the preceding, a German philosopher of the so-called younger Hegelian school, born in Anspach in 1804, studied theology and philosophy at Heidelberg and Berlin from 1822 to 1825, and became a tutor at the university of Erlangen in 1828, but retired into private life soon after, occupying himself solely with literary labors. In 1844 he delivered a brief course of lectures at the university of Heidelberg. He subsequently retired to a small village in Franconia, where he directs an industrial establishment, and devotes his leisure hours to literary pursuits. Among his works (a collection of which has been published in 9 vols., 1846–'57) the following are the most important: *Abälard und Heloise* (1833); *Geschichte der neueren Philosophie* (2 vols., 1833–'37); *Pierre Bayle* (1838), *Das Wesen des Christenthums* (Leipsic, 1841); *Das Wesen der Religion* (2d ed., 1849), *Theogonie* (Leipsic, 1857).—The leading principle of Feuerbach's philosophy is the identification of God with the idealized essence of man, or the deified essence of nature. His own statement is: "My theory may be condensed in two words: nature and man. That being which, in my opinion, is the presupposition, the cause of existence of man, is not God—a mysterious, vague, indefinite term—but nature. On the other hand, that being in which nature becomes conscious of itself, is man." "True, it follows from my theory that there is no God, that is to say, no abstract being, distinct from nature and man, which disposes of the destinies of the universe and mankind at its discretion; but this negation is only a consequence of the cognition of God's identity with the essence of nature and man."

FEUILLANTS, a branch of the order of Cistercians, founded in France in 1577 by Jean de la Barrière for the stricter observance of the rules of St Benedict, and declared independent by Sixtus V. in 1586. It received originally a very severe discipline, its members being obliged to go with naked head and feet, to sleep upon planks, and to eat on their knees. The rules were subsequently greatly relaxed, and the order spread over France and Italy. It was distinguished by the part which its members, especially the preacher Bernard de Montgaillard, called *Le petit Feuillant*, took in the civil wars of France in the time of the league. After having been the centre of numerous agitations, the Feuillants of France were in 1630 separated from those of Italy. Their costume was a white robe without a scapular, and a white cowl.—De la Barrière founded at the same time a female order of Feuillantes, whose convent was first near Toulouse, and afterward, by invitation of Anne of Austria, in Paris. The severe discipline to which the members of this order at first subjected themselves caused the death of many of them, and was reprimanded by the pope. The order lasted till 1790.—In the French revolution a club opposed to the Jacobins was known as the Feuillants, from their meeting in a convent of the abolished order.

FEUILLET, Octave, a French author, born in St. Lo, Manche, in 1822. He was educated at the college of *Louis le Grand* in Paris, and since 1845 has gained a high reputation as a graceful writer of novels and plays, in some of which other literary men have been his collaborators. A collection of his writings was published in 1853–'56, in 3 vols., in the *Bibliothèque contemporaine*. His most popular novel, *Roman d'un jeune homme pauvre* (Paris, 1858), has been dramatized in France and in Germany (Vienna, 1859), and translated into English (New York, 1859).

FEVER, the name commonly applied to the assemblage of symptoms formed by acceleration of the pulse, chills followed by heat, thirst, and a general feeling of lassitude and uneasiness; various names have been added to the fever, according to the organ affected, or the supposed nature of the morbific cause. There is no subject which has been a greater source of contention among physicians, or has been more discussed in the schools of medicine from Hippocrates to Louis and Chomel, than that of the nature and seat of fever; and even at the present time different and opposite opinions prevail concerning it. According to Laënnec, Hippocrates considered fever as a simple disease, always of the same nature, regarding as complications the symptoms which modern pathological anatomy has made characteristic of the numerous varieties of fever. Celsus regarded fever as a general disease. Galen seems to have been the first to give a precise definition of the word, and to have divided fevers into the idiopathic or essential, and the symptomatic, an idea which has been the cause of endless and bitter disputes in the medical world. He made, however, a great progress when he discovered that many so called fevers are the consequence of local inflammations; it has been said that in his writings may be traced the division of fevers into inflammatory, bilious, mucous, putrid, and malignant, the famous "pyretological pentateuch," sanctioned afterward by the authority of Pinel. The principles of Galen influenced the medical world until the time of Stahl, Hoffmann, and Boerhaave. Stahl considered fever a salutary effort of the vital principle to throw out morbific matter by the increased excretions and secretions; Hoffmann made it consist in the febrile heat (fever of the Greeks), and in its preceding chill; Boerhaave laid still more stress on mechanical principles, and regarded it as an acceleration, agitation, and combination of the various fluids, by which the cause of disease underwent a coction and elimination, with the characteristic symptoms of fever. Cullen disbelieved

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the humoral causes of fever, and traced its origin to the nervous system, the depression of whose energy produces at first feebleness of all its functions, followed by reaction, spasm, and increased circulation, on the degrees of which the varieties and duration of fevers depend; he divided remittent fevers into inflammatory and nervous, calling the former *synocha* and the latter *typhus;* he admits also a third, the common fever of his country, a combination of the other two, but most resembling typhus, which he calls *synochus*. Sauvages, by combining together different febrile symptoms, established more than 150 kinds of fever, ridiculing the idea of essentiality, and considering all fevers as symptomatic. The results of the observations of the 18th century had in all countries diminished the number of essential fevers, and increased that of local inflammations. Sydenham regarded the violence of inflammation as the principal cause of what was then called the malignancy of fevers, and said that the consequences arising from the previous understanding of that word had been more destructive to the human race than gunpowder. Notwithstanding the occurrence of several epidemics in the last third of the 18th century which seemed to prove that intestinal inflammation is the cause of some fevers, the essentiality of these diseases still held firm possession of the minds of physicians; the mucous fever at Göttingen in 1760 and 1761, that at Naples in 1764, and the petechial fever at Genoa in 1799 and 1800, in most cases were what is now called typhoid fever, whose principal lesion is in the Peyer's patches of the ileum. At this time Pinel divided essential fevers into 5 varieties, which are only badly characterized portions of the course and modifications of typhoid fever; and, though he denied their connection with local inflammations, his very names of angiotenic, meningo-gastric, and adeno-meningeal, recognize the influence of such inflammations, especially those of the gastro-intestinal mucous membrane. The researches of Prost in 1804 gave the first decided blow to the theory of the essentiality of fevers. These were followed by the discovery of Petit, who traced in a clear and positive manner the connection between the ulceration of Peyer's glands and entero-mesenteric fever, afterward so fully illustrated by Louis in his work on typhoid fever. Upon this fever was made to turn the whole theory of non-essentiality, its intestinal manifestation forming the connecting link between the febrile exanthemata with evident cutaneous inflammation, and other fevers where anatomical lesions were not so apparent. It was reserved for Broussais, the author of the so called physiological doctrine, in 1816, to completely overturn the doctrine of essentiality, and to maintain that all fevers enter into the category of local inflammations. Almost all the medical writers of France flocked to the standard of Broussais, who in his own country at least bore down all opposition. Still, many enlightened physicians in other countries, and Chomel and Gendrin in France, did not accept the sweeping conclusions of the new nosology, which, from the very fact of its exclusiveness, opposition to received opinions, and bold advocacy, as in many subsequent and present medical delusions, led away in a body the great mass of routine practitioners and the ever credulous public. While with Bouillaud there is no such thing as essential fevers, all such being symptomatic of inflammation, vascular irritation, or action of complicating putrid matters in the blood, Chomel, at the same time that he admits fever as symptomatic of local inflammations, from clinical and post-mortem researches, maintains the existence of idiopathic fevers, with acute and general symptoms, independent of local affections, and leaving after death no lesions to which the phenomena could be fairly attributed. Louis has established satisfactorily a connection between typhoid fever and the anatomical lesion of the glands of the ileum; but he does not explain the nature of this lesion, whether it is the cause or consequence, why death occurs in this disease before the appearance of the intestinal affection, and why the grave symptoms continue and even prove fatal after the cicatrization of the ulcers; in fact, this fever, which many make the turning point in the discussion, stands much in need of further investigation. It is evidently impossible to decide for one or the other of the exclusive opinions of essentiality or non-essentiality of fevers; the most able physicians of the world would probably occupy at present the middle ground of Chomel, accepting the febrile affections symptomatic of inflammation, but also certain essential or continued fevers characterized by the want of relation between the severity of the symptoms and the slight extent of anatomical lesion, by the special nature of their causes (as in contagious, endemic, and epidemic fevers), and by such a series of general phenomena that no one local lesion could in any way explain them. Leaving, then, the nature of fever to be settled by future researches, a few of the principal forms mentioned in the books may be alluded to here. Among the fevers symptomatic of external or internal inflammations are: the traumatic fever, accompanying wounds and surgical operations; lung fever, which is pneumonia, or inflammation of the lungs; brain fever, or inflammation of the substance or membranes of this organ; rheumatic fever, or acute rheumatism; catarrhal fever, accompanying epidemic influenza; milk fever, the functional disturbance attending the physiological secretion of this fluid, coming on the 3d or 4th day after delivery, and rarely lasting more than 24 hours; and puerperal fever, by which is understood inflammation of the peritoneum, or of the uterus and its appendages, attacking women recently delivered, and sometimes raging endemically, becoming contagious, and seeming to arise from and to produce phlegmonous erysipelas. In all these forms the heat of the surface is increased, the pulse accelerated, the thirst great, the urine less, with lassitude, weakness, sweating, and

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peculiar symptoms according to the organ attacked; this condition may unquestionably be produced by fatigue, by the influence of physical agents, and by moral causes. Intermittent fevers (like fever and ague) are characterized by paroxysms of chills, heat, and sweating, regularly succeeding each other, with intervals of complete apyrexia; they are irregular, quotidian, tertian, or quartan, according as the interval is one, two, or three days, or of varying and longer duration; in miasmatic districts many diseases take on an intermittent type, which under ordinary circumstances have no such character. According to Chomel, the double quotidian fever is always, and the common quotidian in half the cases, symptomatic of inflammation in the pulmonary, digestive, or urinary mucous membranes, of the 2d stage of phthisis, or of deep-seated and superficial suppurations; so that the duration of intermission becomes an important diagnostic sign. Even in the course of typhoid fever, chills will often occur at the same hour for a few days in succession. Remittent fevers are characterized by a continuous febrile condition, complicated with intermittent symptoms of chills and heat at the beginning of their course, and of heat toward their close; they seem in many cases to be of miasmatic origin, and to be modified intermittents. Continued fevers have no intermissions during their course, but generally one or two paroxysms of increased febrile condition, without chills during the 24 hours; they affect the whole system, independent to a certain extent of organic lesions, yet characterized by symptoms indicating cutaneous or gastro-intestinal irritation. The simplest is the ephemeral continuous fever, having the usual symptoms of lassitude and uneasiness, with heat of skin, thirst, headache, and rapid pulse, rarely lasting more than a day or two, and frequently caused by fatigue of body or mind, or vivid emotions. The most common continued fever of the United States is the typhoid, which will be described under its own title; slow and nervous fevers are mere forms of it. Hectic fever is that form well known in persons suffering from lingering and exhausting diseases, as in consumption and chronic suppurations. Yellow fever, or black vomit, is endemic in tropical and subtropical America, requiring for its development a high temperature and a locality on or near the sea coast; it seems to spend its first force upon the gastro-intestinal mucous membrane, as does the epidemic cholera. In this class of continued fevers belong the exanthemata, such as small pox, measles, and scarlatina. The division of fevers into idiopathic and symptomatic seems to be sanctioned by the quantity of fibrine in the blood, Andral having found its amount invariably diminished in the former and increased in the latter; in ordinary continued fever, when uncomplicated with local disease, the amount was more or less diminished, with an increase in the quantity of corpuscles; local inflammation tends to increase it, but the febrile condition itself limits this increase; in typhoid fever the decrease of fibrine in proportion to the corpuscles is still more marked, though here also any local inflammation will increase it; the eruptive fevers were not found to present such a striking disproportion between the fibrine and the corpuscles, and their specific inflammations did not tend to increase the former like ordinary inflammation; in the so called putrid fevers not only the fibrine but all the solid constituents of the blood are diminished. The prognosis of fevers depends on the type, the constitution of the individuals attacked, and the surrounding circumstances as to pure air, cleanliness, and proper attention; continued fevers are most common and most fatal among the poor and crowded populations of cities and of unhealthy localities; wherever such diseases are known to prevail, hygienic and sanitary measures will generally remove the predisposing and render harmless the exciting causes. The treatment of fever must depend also on the type, and be antiphlogistic, tonic, stimulant, specific, or expectant, according to the ascertained nature of its cause.

FEVER BUSH (*benzoin odoriferum*, Nees), a shrub from 4 to 10 feet high, with long, slender, and brittle branches, common in the northern United States, and remarkable for its graceful form and large handsome leaves, especially when it grows upon the margin of some cold, swampy place in the deep shade of woods. Here it produces an abundance of flowers and fruit. The flowers appear in April or May in clusters from 3 to 6 in number, are of a greenish yellow color, and come out where the last year's leaves were. The fruit is a small, oval, dark red or purple drupe, in bunches of 2 to 5. The twigs or young branches are smooth and of a bright green, which assumes an olive tint the next year, and afterward a pearly gray. A decoction of the twigs is used to alleviate the itching from poisoning by sumach. According to Dr. Darlington, it is also used as a medicine for horned cattle in the spring. The berries have a pleasant, spicy taste, and are much admired, and have sometimes been used as allspice.

FEW, William, colonel, an American revolutionary officer, born in Maryland, June 8, 1748, died in Fishkill, N. Y., July 16, 1828. His father removed to North Carolina when his family was young. Here William received a good education, and on the breaking out of the revolution became distinguished for zeal and ability in the patriot cause. In 1776 he removed to Georgia, where he was elected a member of the convention for framing a constitution. For the next 25 years he was employed in various public offices; he was surveyor-general of the state, presiding judge of Richmond co. court, and in 1780 a member of congress, remaining in that body till the peace, and again appointed in 1786. The next year he assisted in forming the federal constitution. He distinguished himself in various actions with the English and Indians.

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About 1785 he engaged in the practice of the law, and in 1798 was a member of the third constitutional convention of Georgia. From 1789 to 1793 he held a seat in the U. S. senate. About 1800 he removed to the city of New York, where he filled several offices, and was at one time mayor.

FEZ (Ar. *Fas*), a province of Morocco, occupying the N. portion of that empire, bounded N. by the Mediterranean, E. by Algeria, S. by the mountains of Atlas, W. by the Atlantic. The face of the province is a rich champaign country, productive in grain, chiefly wheat and barley, honey, tobacco of the kind called *meguinasi*, olives, and wine. The principal mountains are the Zaragh and Zarkon, or Zaraharum. The chief river is the Sebou, which, rising in the E. part of the province near the Atlas mountain, passes within 6 m. of the city of Fez, and enters the Atlantic at Mamora, where it is navigable. The chief cities are Fez and Tangiers, the principal commercial seats of the empire, Mequinez, Tetuan, Larach, Salee, Rabat, and Al-Kasar. The Spanish presidios of Ceuta, Alhucemas, Señor-de-Velez, and Melilla are in this province, on the Mediterranean. Fez was an independent kingdom till conquered and annexed to Morocco in 1548.—The city of Fez is situated in lat. 34° 6′ 3″ N., long. 5° 1′ 11″ W., 85 m. S. from the Mediterranean, 100 m. E. from the Atlantic, and 80 m. S. E. from Tangier, on the slope of a valley watered by the river Fez, also called Wad-el-Jubor (river of pearls), which divides within the city into 2 branches, supplying the baths and fountains; pop. estimated at 80,000, including 10,000 Berbers, 5,000 negroes, and a large number of Jews. The city, surrounded by dilapidated walls, is 4 m. in circuit, and is divided into the old and new towns, both, however, ancient, and both composed of narrow, dirty streets. The houses are of brick, with galleries and flat roofs. It is one of the 3 residences of the emperor, but the palace, although large, is not remarkable. In the 16th century this place was a famous seat of Arabic learning. It has yet a university called the house of science, colleges, and elementary schools. Formerly the city contained some hundreds of mosques, and is said still to have 100, of which the principal are El Carooboen, and the mosque of Sultan Muley Edris, founder of the city. The former has a covered court for women to pray in, and the latter, which contains the remains of the founder, is a sanctuary for criminals. From its abundance of mosques and relics Fez is the holy city of the western Arabs. It possesses 200 caravansaries, some hospitals, and manufactories of woollens, sashes, silk stuffs and girdles, the red woollen caps called fez (dyed of a bright red color by means of a berry found in the vicinity), slippers, coarse linens, fine carpets, saddlery, &c. Of the fine leather known by the name of morocco, the red comes from Fez. Its artisans are also very skilful in goldsmith's work and jewelry. It is the depot of the inland trade, and collects for export gums, spices, ostrich feathers, ivory, &c. Caravans set out from the city semi-annually, in March and October, across the desert for Timbuctoo. They complete the round journey in 139 days, of which only 54 are employed in actual travel. The pirates who inhabit Riff, one of the provinces of Fez, committed depredations in 1855 and 1856 on Prussian and French vessels as well as on a Spanish establishment on the coast, and the sultan made a compensation to the French government in 1856.

FEZZAN (anc. *Phazania* and the land of the Garamantes), a country of Central Africa, generally supposed to reach from lat. 24° to 31° N., and from long. 12° to 17° E., but the boundaries are ill defined; pop. estimated at from 75,000 to 150,000. It lies south of the pashalic of Tripoli, to which it is tributary, and is bounded on all other sides by the Sahara. In consequence of the want of moisture, and the great heat, it is almost barren of vegetation. The soil consists of black shining sandstone, or the fine sand of the desert. The valleys intersecting the low ranges of hills contain the cultivable land of the region. The Black Haratch, the White Haratch, and other mountain ranges, cut Fezzan generally in the direction of N. W. to S. E. The land lies in a hollow lower than the surrounding desert. The heat in summer is intense, rising sometimes to 133° F. In winter the cold is greater than might be anticipated from its latitude; in 1850 snow fell at Sockna, and ice as thick as a man's finger was found at Moorzook. There are no rivers nor brooks, and rain seldom falls, thunder storms are rare, and the climate is very unhealthy for Europeans. Dates are the staple product; small quantities of maize and barley are grown. Among the other productions are figs, pomegranates, watermelons, legumes, durra, and a little wheat. Of domestic animals, goats are the most numerous; camels, horses, and asses are reared. Of wild animals, there are the lion, leopard, hyena, jackal, buffalo, fox, and porcupine; among birds, vultures, falcons, and other birds of prey, with ostriches and bustards. Fezzan is exempt from flies, but ants, scorpions, and bugs abound. Planted on the high road of commerce between the coast of Africa and the interior, the Fezzaneers place their main reliance upon the caravan trade. From Cairo to Moorzook the caravan takes about 40 days, from Tripoli to the same place about 25 days. Of manufactures the country is almost destitute. Fezzan is inhabited by two branches of the Berber race: the Tuariks, who occupy the N. W., and the Tibboos, who dwell in the S. E. Their complexion is dark brown, their cheek bones are prominent, hair woolly, faces flat, eyes small, lips thick and protuberant. Their persons are well formed. They speak a corrupt dialect of Arabic and Berber; their media of exchange are Spanish coin and grain. The country is ruled by a sultan, who resides at Moorzook, and can bring about 15,000 men into the field. The chief sources of his revenue are taxes upon slaves and merchandise.

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The only places exhibiting to the eye some degree of life and prosperity, according to Dr. Barth, are Moorzook and Sockna. The population of each is estimated at about 3,000. Cornelius Balbus Gaditanus, Roman proconsul of Africa, penetrated into Phazania about 20 B. C. The remains of Roman civilization, in the shape of columns or mausoleums, are still found as far S. as 26° 25′ N. In the 7th century Fezzan fell under the dominion of the Arabs, who introduced Mohammedanism, to which religion the Fezzaneers are still fanatically attached. Since then Fezzan has generally been tributary to some Arab potentate. In 1811 the bey Mukni usurped the throne, and acknowledged allegiance to the pasha of Tripoli. Fezzan has been much visited by modern travellers, and is regarded as the starting point for the interior of Negroland. Denham and Clapperton, Oudney, Hornemann, Lyon, Ritchie, Barth, Richardson, and lastly Dr. Vogel, have all visited and described it.

FIARD, Jean Baptiste, abbé, a French demonologist, born in Dijon, Nov. 28, 1736, died there, Sept. 30, 1818. He accounted for the perversities of human conduct by supposing demoniac agency, and it was his opinion that Voltaire and other philosophers of his time were merely demons, and denounced them as such before an assembly of the clergy of France in 1775. The French revolution seemed to him a great diabolic triumph, and his opinion was confirmed by his own imprisonment for 2 years for persisteuce in the exercise of the priesthood.

FIBRINE, a nitrogenous compound which forms the solid portion of the flesh or muscular fibre of animals, and also the fibrous portion of the blood. A substance identical with it in composition is found in the newly expressed juices of plants, particularly in the grape, when these are allowed to stand for some time, and the gelatinous substance that is deposited is washed free from the coloring matter associated with it. This is called vegetable fibrine. It exists also in wheat flour, being separated in the substance commonly called gluten. Animal fibrine is separated from the muscle or flesh by washing the soluble saline coloring and albuminous matters with cold water, and then dissolving the gelatinous and fatty matters with hot water. The residue is principally fibrine. It is obtained from freshly drawn blood by taking up the ropy portions that adhere to a twig with which it is stirred, and thoroughly cleansing these of coloring and soluble matters by washing. It is a soft white substance, which becomes on drying yellowish, brittle, and semi-transparent. Numerous analyses have been made of the fibrine, albumen, and caseine derived from vegetables used for food—the albumen from the clarified juice of turnips, asparagus, &c., and the caseine from beans and peas—and the results prove an identity of composition not only among themselves, but with the chief constituents of the blood, animal fibre, and albumen. One of the analyses of animal fibrine by Sherer might almost equally well be given for either of the other substances, or indeed for the caseine of milk, which is in no respect different. The following is one of many quoted by Liebig: carbon, 54.454; hydrogen, 7.069; nitrogen, 15.762; oxygen, sulphur, phosphorus, 22.715. When meat is cooked, the quick application of a strong heat or of boiling water causes the albuminous liquid which surrounds the fibrine to coagulate and enclose the savory juices in a coating they cannot penetrate. The fibrine is also thus protected and remains tender. Cold water does not coagulate the albumen, and so the juices escape when the meat is placed in it, and the fibrine afterward contracts in cooking and becomes poor and tough. In young animals the fibrine is accompanied with more of this albuminous liquid than in those that are older.

FICHTE, Johann Gottlieb, a German philosopher, born in Rammenau in Lusatia, May 19, 1762, died in Berlin, Jan. 27, 1814. He was the son of a poor weaver, and owed his education to the munificence of a wealthy nobleman, the baron of Miltitz. He studied theology at Jena, Leipsic, and Wittenberg, 1780–'83, and for 10 years obtained a precarious living as a private tutor. Not unfreqnently during this time he was brought to the verge of abject poverty. While at Königsberg in 1792, he became acquainted with the philosopher Kant, of whom he had been one of the earliest and most enthusiastic admirers, and as an application of his philosophy wrote a pamphlet entitled *Kritik aller Offenbarungen* ("Review of All Revelations"), which, having been published anonymously, was generally believed to have been written by Kant himself. In 1793, while residing in Switzerland, he published a work in 2 volumes "to rectify public opinion in regard to the French revolution." In 1794 he obtained a professorship at the university of Jena through the influence of Goethe, then secretary of state of Saxe-Weimar. In the same year he published a treatise containing the fundamental doctrines of his philosophical system: *Ueber den Begriff der Wissenschaftslehre* ("On the Idea of a general Theory of Knowledge"), and during the next 5 years his system was matured and completed. By it he immediately took rank among the most original living philosophers, and as it appeared to furnish a metaphysical basis for progressive political and religious views, he was considered one of the leaders of the liberal party in Germany. The Saxon government, becoming alarmed at the boldness of his theories, insisted on his removal, and Goethe, though secretly sympathizing with him, felt himself bound to express to him his official disapprobation. Exasperated by these proceedings, Fichte resigned his professorship and appealed to the public in a pamphlet entitled *Appellation gegen die Anklage des Atheismus*. But this appeal, although proving the deep earnestness of Fichte, could scarcely be considered as a conclusive refutation of the objections raised

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against his doctrines. He maintained in it that science could conceive the idea of existence only in regard to such beings or things as belonged to the province of sensual perception, and that therefore it could not be applied to God. God was not an individual being, but merely a manifestation of supreme laws, the logical order of events, the *ordo ordinans* of the universe. For the rest, Fichte held that the question whether a philosophical system was atheistic or not was utterly preposterous. It was, he said, no less ridiculous to ask a philosopher if his doctrines were atheistic than to ask a mathematician whether a triangle was green or red. From Jena Fichte went to Berlin, where by his writings and lectures he exerted a great influence on public opinion, and after the reverses which befell the Prussian monarchy became one of the most conspicuous and powerful anti-Napoleonic agitators. For a few months only (1805), he accepted a professorship at the university of Erlangen. After the battle of Jena (1806) he went to Königsberg, and thence to Copenhagen, but returned to Berlin in 1807. While the French conquerors were still there he delivered in the academy his "Addresses to the German Nation" (*Reden an die deutsche Nation*), which even to this day are admired as a monument of the most intense patriotism and depth of thought. Immediately after the establishment of the Berlin university in 1810, he accepted a professorship there. In 1813 he resumed his political activity with great success. When at last the deliverance of Germany from French oppression had given him sufficient tranquillity of mind to resume the completion of his philosophical system, he fell a victim to the noble exertions of his wife in the cause of charity. By nursing the sick and wounded in the military hospitals for 5 months she had become infected with typhus. She recovered, but her husband, who had also taken the disease, succumbed to it.—Beside the above mentioned publications of Fichte, the following are his principal works: *Grundlage der gesammten Wissenschaftslehre* (1794); *Grundlage des Natur-Rechts* (1796–'97); *System der Sittenlehre* (1798); *Ueber die Bestimmung des Menschen* (1801); *Anweisung zum seligen Leben* (1806). His complete works were published at Berlin in 1845. To give a succinct and intelligible analysis of Fichte's philosophical system is next to impossible. His language is extremely pedantic, abstruse, and liable to misconstruction, to which, indeed, Fichte's philosophy has been subject in a higher degree perhaps than that of any other modern philosopher. Thus, for instance, to designate the self-conscious intellect as contrasted with the non-conscious objects of its conception, he uses the personal pronoun "I" as contrasted to the "not I" (*Ich* and *Nicht-Ich*, in English versions generally rendered by the Latin *ego* and *non-ego*); and this was misconstrued by many of his contemporaries as a deification of his own individual self, while in point of fact he meant only that which by other moderns has been called the absolute, and by the ancient philosophers the substance. Fichte's philosophy was intended to amplify that of Kant. Kant, in investigating the theory of human cognition, had arrived at the conclusion that all properties of external objects, by which they are discerned and known, are not realities, transferred from without into the human mind, but mere forms of conception innate in the human mind. Hence he argued that objects *per se*, or such as they really are, independent of human cognition, are utterly unknown to man. So far as man is concerned, they are only phenomena, that is to say, for man they exist only as they appear to the human mind according to its forms of conception (categories), while as *noumena*, or such as they are *per se*, they are unknown and inconceivable. Now that which Fichte attempts to prove is simply this, that between objects as they appear to human conception, and such as they are, there is no real difference, since the forms of human cognition are identical with the action of the absolute intellect; that objects are only the limit set by the absolute within itself in order to arrive at perfect self-consciousness; that the absolute (the *Ich*) is at the same time subject and object, the ideal and the real. Reduced to plainer language, all this would mean that God (the absolute subject, the great active and creative "I") and nature (the "not I," the aggregate of objects) are united in a similar manner as soul and body; that the absolute intellect pervades all and every thing, and that the human mind is an integral part of the absolute intellect. But, clothed in the most singular and obscure formulas, the theory of Fichte was understood by many to mean that all reality existed only in the imagination of man, and was in fact merely an outward reflection or manifestation of the workings of the human mind. Such was not his idea, and the term "idealist," when applied to Fichte, has a different meaning from that in which it is applied to Berkeley. That the ultimate consequences of Fichte's system would have led him into a sort of pantheistical mysticism is apparent from his later writings, in which the "I" is, much more clearly than in his earlier works, set forth as God, and all individual minds only as reflections of the absolute. Applying his metaphysical theories to ethics, Fichte concludes that morality consists in the harmony of man's thoughts (conscience) and actions. Entire freedom of action and self-determination is, according to Fichte, not merely the preliminary condition of morality, but morality itself. Hence law should be nothing more than a determination of the boundaries within which the free action of the individual must be confined, so as to concede the same freedom to others. Law has no meaning or existence without society. The object of society is the realization of the supreme law as conceived by human reason. The most perfect state of human society would be the true kingdom of heaven, since the absolute or God is revealed in the rational development of mankind. It is easily seen how these

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ethical doctrines of Fichte appeared in practice. Maintaining that self-reliance and self-determination were the only guarantees of true morality, and contending against the assumption of the divine right of political institutions, he furnished a philosophical basis to the liberal political parties who opposed the sanctity of popular rights to the assumed divine right of monarchs. In order to insure to the people the greatest possible amount of rational well being, Fichte taught that the introduction of the most universal popular education was one of the principal duties of the state. In regard to this subject his urgent appeals to the German governments have been highly successful. The identity of the subject and object, or of the ideal and real, as taught by Fichte, afterward became the basis as well of Schelling's nature-philosophy as of Hegel's philosophical system, the former of which attempts a logical construction of the universe from the standpoint of the object (nature), while the other attempts the same from the point of view of the subject (the human mind). Heinrich Heine draws an ingenious parallel between Kant and Robespierre on the one hand, and Fichte and Napoleon on the other. Like Robespierre—this is Heine's statement—Kant by his reasoning destroyed all that to former thinkers had appeared as reality, leaving man solitary with his thoughts and his cognition; like Napoleon, Fichte combined thought and action into one, and attempted to reconstruct the world of realities by the unrestrained action of gigantic thought. This parallel might be further extended to Schelling, whose mystical nature-philosophy would then correspond to the period of the French restoration, and that period of French literature represented by the romantic school; and to Hegel, whose elaborate philosophical system of checks and balances might be made to correspond to the constitutional period of French history under Louis Philippe. These comparisons are no mere fancies. Certain it is that all those seemingly abstruse systems of philosophy, which to outsiders appeared merely as abstract metaphysical lucubrations, had for Germany herself a practical meaning, and served as an ultimate basis for the aspirations of political parties. Thus, it might be shown that the system of Kant lay at the bottom of the sympathies with the levelling tendencies of the French revolution, which during the last 10 years of the 18th century became manifest in some portions of Germany; that Fichte's idealism was the source from which sprung the aspirations of the *Burschenschaft* toward a regeneration of the German empire in all its mediæval splendor; that Schelling's mysticism had much to do with the retrograde political romanticism of the feudal party; and lastly, that the Hegelian system was the guiding light of those political parties in Germany whose aim was a constitutional monarchy. The close affinity between those philosophical systems and political tendencies was as apparent to their immediate contemporaries as was in 1848 the affinity between the theories of the so-called younger Hegelian school and the republican movements of that time. Fichte's transcendental idealism, as it was called, is therefore not a philosophical system in the same meaning as those of the ancients, but merely a single stage in the intellectual and political progress of Germany. Viewed in this light, it has in its time exerted a great influence on the mind of the German nation, and largely contributed to that popular enthusiastic excitement by which the French dominion over central Europe was destroyed. The *Grundzüge des gegenwärtigen Zeitalters* (Characteristics of the Present Age), *Wesen des Gelehrten* (Nature of the Scholar), *Bestimmung des Menschen* (Vocation of Man), *Bestimmung des Gelehrten* (Vocation of the Scholar), and some other of Fichte's works, have been translated into English by Smith, who has also written a memoir of the author.—IMMANUEL HERMANN, son of the preceding, born at Jena in 1797, filled from 1822 to 1842 professorships at several Prussian colleges, and since 1842 has been professor at the university of Tübingen. He has published many philosophical works, mostly following the theories of his father, though he claims to have established a system of his own, which, in contradistinction to the Hegelian pantheism, he calls concrete theism.

FICHTELBERG, or FICHTELGEBIRGE (mountain of pines), a chain of mountains in the kingdom of Bavaria, province of Upper Franconia, between the Bohemian forest and the Franconian Jura, covered with forests of firs and pines. By reason of its position in the centre of Germany this chain is regarded as the nucleus of all the Germanic mountains, though it does not surpass the neighboring chains in elevation. It separates the affluents of the North and Black seas, the river Naab descending from it on the S., the Saale on the N., the Eger on the E., and the Main on the W. It extends in length 36 m. N. E. from Baireuth to the Bohemian frontier, and its 2 loftiest summits are Ochsenkopf (Ox head) and Schneeberg (Snow mountain), respectively 3,397 and 3,450 feet high. The Fichtelberg possesses a robust and laborious population of 155,000. The upper part of the mountain yields oats and wood in abundance, and the lower parts produce rye, barley, flax, pulse, and a little wheat; but the chief industry of the inhabitants is in working the numerous mines of iron, vitriol, sulphur, lead, copper, and marble. The mountains are densely populated and traversed by good roads, and in the S. W. by the Saxon-Bavarian railway.

FICINO, MARSILIO, a Platonic philosopher of the 15th century, born in Florence, Oct. 19, 1433, died in Careggi, Oct. 1, 1499. He was the son of the first physician of Cosmo de' Medici, and was intended for his father's profession. A learned Greek, Gemistos Pletho, an enthusiastic student of the long forgotten philosophy of Plato, inspired Cosmo with so much of his own enthusiasm, that the latter deter-

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mined to naturalize this philosophy at home. He selected young Ficino as a youth of great promise, to be instructed in the mysteries of Platonism, and to become the chief and preceptor of a new Platonic academy. He educated him in his palace, surrounded him with Greek masters, encouraged him to read in their native language the philosophers of antiquity, placed him when 30 years old at the head of the academy of Florence, and charged him to be the interpreter and propagator of the Platonic philosophy in the West. Ficino made numerous translations from Plato, Iamblichus, Hermes Trismegistus, whom he especially admired, and from most of the Alexandrian philosophers. Too weak to hold the balance between Plato and Aristotle, and between Plato and the Alexandrians, he became the disciple of all schools, and borrowed from all systems. He treated of the nature and immortality of the soul, the functions and distinguishing characters of angels, and the being and attributes of God. His chief merit, however, is as the translator and first western admirer of Plato, and in his partiality for this philosopher he is said to have endeavored to introduce fragments from his writings into the offices and prayers of the church.

FICQUELMONT, Karl Ludwig, count, an Austrian statesman and general, born at Dienze, Lorraine, March 23, 1777, died in Venice, April 7, 1857. He was a son of Count Joseph, who, after emigrating from Lorraine to Austria, died in 1799 from a wound received at the battle of Magnano. Like his father, he fought against the French, and became in 1813 major-general, and afterward general of cavalry. He was employed as Austrian ambassador, and on special important diplomatic missions in various countries, became minister of foreign affairs during Metternich's temporary absence from Vienna in 1839, and joined the cabinet in 1840 as minister of conference and as director of the war department. During the revolution of 1848 he was for a short time minister of foreign affairs, and then provisional prime minister, till May 4, when he retired on account of a hostile demonstration of the people, who looked upon him as a disciple of Metternich. He afterward wrote several political pamphlets, some of which, as *Lord Palmerston, England, und der Continent* (Vienna, 1852), and *Zum künftigen Frieden* (1856), attracted considerable attention. *Les pensées et reflexions morales et politiques du Comte de Ficquelmont* appeared in Paris in 1859, with a biographical notice by M. de Barante.

FICTION, in law, a supposition which is known not to be true, but which is taken to be true, in order that certain conclusions and inferences may be supported. Fictions were formerly used more frequently than at present; and most of those which are still retained are simply absurdities which might better be abandoned. Thus, in the action of trover, in which the plaintiff demands damages for the defendant's refusal to deliver to the plaintiff his property in the defendant's possession, the plaintiff declares that he lost the thing in question, and the defendant came into possession of it by finding, and has converted it to his own use; and the defendant is not permitted to deny the losing or finding, the only question being whether he has refused to give to the plaintiff property which the plaintiff has a right to demand from him. Other familiar instances are the *nunc pro tunc* suppositions that a thing done now was done at a former time, and all the John Doe and Richard Roe proceedings. The fictions of the common law were derived, it is said, from the Roman civil law, in which the prætor, for the sake of doing justice without violating the law, was permitted to suppose a state of facts to exist other than the real one. In the old law, fictions were said to be "of five sorts, abeyance, remitter, relation, presumption, and representation." To avoid the mischiefs which might result from them, there were certain rules, such as the following: 1, the law never makes fictions but from necessity and to avoid a wrong; 2, they must not be of a thing impossible; 3, they are never admitted where truth will work as well; 4, they are confined to civil cases, and are not permitted in criminal trials. But these rules, excepting the last, were not of much practical value; and the true explanation of legal fictions is, that they belong to the old system of technicality and formula, and have for the most part disappeared. What are called presumptions of law (which will be treated under their own head) are sometimes classed with fictions, but not accurately.

FIELD, David Dudley, an American jurist, born in Haddam, Conn., Feb. 13, 1805, the eldest son of the Congregational minister of that town. When he was 14, his father removed to Stockbridge, Mass., and in 1821 he entered Williams college. In 1825 he commenced the study of law, was admitted to the bar in 1828, and immediately entered upon practice in the city of New York, where he has been conspicuous at the bar for more than 30 years. He is especially known by his labors in the cause of law reform. As early as 1839 he published his first essay on the subject, pointing out the defects of the old system, and the necessity of a reconstruction of the modes of legal procedure. This he followed up by other articles on the same subject in 1842, 1844, 1846, and 1847. In the latter year he was appointed by the legislature of New York a commissioner on practice and pleadings, and as such took the leading part in the preparation of the code of procedure. Of this work only a part has been as yet enacted into law, half of the code of civil procedure, and the whole of the code of criminal procedure, remaining still to be acted upon by the legislature. The radical design of the new code of civil procedure is to obliterate the distinction between the forms of action and between legal and equitable suits, so that all the rights of the parties in relation to the subjects of litigation can be determined in one action, instead of dividing them as heretofore between

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different suits, often inconsistent and always perplexing. Upon this idea as the foundation the whole system is built, and the effect has been to produce a legal revolution, not only in New York, but in the states of Missouri, Ohio, Kentucky, Indiana, Alabama, Minnesota, California, and Oregon. From America the reform soon attracted the attention of the law reformers of England, with Lord Brougham at their head, and through their influence it has modified the legislation of Great Britain and her colonies. In 1857 Mr. Field was appointed by the legislature of New York at the head of a new commission to prepare a political code, a penal code, and a civil code, works which are designed to contain, with the codes of procedure, the whole body of the law.—CYRUS WEST, an American merchant, brother of the preceding, chiefly known from his connection with the Atlantic telegraph, born in Stockbridge, Mass., Nov. 30, 1819. He was educated in his native county, and at the age of 15 went to New York, and in a few years fought his way from a clerk's desk to the head of a large and prosperous mercantile house. Such was his success that in 1853 he partially retired from business, and spent 6 months in travelling in South America. On his return he became deeply interested in the project of a telegraph across the ocean. He was first applied to for aid to complete the telegraphic line commenced between St. John's and Cape Ray in Newfoundland. While investigating the subject he considered the practicability of establishing telegraphic communication between Europe and America by a submarine cable stretching from Newfoundland to Ireland. In the early part of 1854 he was instrumental in procuring a charter from the legislature of Newfoundland, granting an exclusive right for 50 years to establish a telegraph from the continent of America to Newfoundland, and thence to Europe; associating himself with Peter Cooper, Moses Taylor, and other citizens of New York, under the title of the "New York, Newfoundland, and London Telegraph Company," for the purpose of carrying this design into effect, and thereby uniting Europe and America by a submarine cable. Mr. Field thenceforth devoted himself almost exclusively to the execution of this project. He participated largely in the construction of the land line of telegraph in Newfoundland and Cape Breton island, and in the two attempts to lay the submarine cable between Cape Ray and Cape Breton, visiting England in 1854 and 1856 on the latter business. In 1856 he organized the "Atlantic Telegraph Company" to continue the existing line to Ireland, subsequently procured from the British and American governments aid in money and ships, and accompanied the expeditions which sailed from England in 1857 and 1858 for the purpose of laying the cable across the Atlantic ocean. Upon his return to America in 1858, after the successful laying of the cable, he was the recipient of enthusiastic ovations in some of the chief cities of the Union. Mr. Field is now (1859) in England, engaged in forwarding a third attempt to lay a submarine Atlantic cable, the electric communication over that of 1858 having been interrupted.—HENRY MARTYN, an American clergyman and journalist, brother of the preceding, born in Stockbridge, Mass., April 3, 1822. He was graduated at Williams college at the age of 16, and after 4 years' study of theology became pastor of a church in St. Louis in 1842. After 5 years he resigned his charge to go abroad. The summer of 1847 he spent in travelling over Great Britain, and the winter following in Paris. Returning to America in the autumn of 1848, he published a historical sketch of the Italian revolutions, and a letter from Rome, on the "Good and the Bad in the Roman Catholic Church," which provoked a good deal of criticism. Soon after, an acquaintance with the families of the Irish exiles residing in New York led him to study the history of the rebellion of 1798, and finally to write a book upon it, which was entitled "The Irish Confederates" (12mo., New York, 1851). In Jan. 1851, he was settled at West Springfield, Mass., whence he removed in 1854 to New York, to become one of the editors of the "Evangelist," a religious journal of that city. In 1858 he again visited Europe, a tour which he described in a volume entitled "Summer Pictures from Copenhagen to Venice" (New York, 1859).

FIELD MARSHAL (Ger. *Feldmarschall*), the highest military dignity in some of the principal countries of Europe. The title originated in France at a remote period, but never conferred exclusive military command, the *maréchaux de camp* of the old French service being inferior officers whose duty it was to select proper places for encampment, provide subsistence for the troops, and in battle to command the wings or the reserve. The corresponding title in France at present is *maréchal de France*. The term in its present signification was introduced into England in 1736, when George II. created the duke of Argyle and the earl of Orkney field marshals, although it had long previously been used in the German military service. The following are (in 1859) the field marshals of the principal European nations: England, the king of the Belgians, Prince Albert, Viscount Combermere, and the earl of Strafford; Austria, Prince Windischgrätz, Counts Nugent and Wratislaw; Prussia, Count von Wrangel. The present marshals of France are: Count Reille (1847), Prince Jerome Bonaparte (1850), Count Vaillant (1851), Magnan (1852), Count de Castellane (1852), Count Baraguay d'Hilliers (1854), Pélissier, duke of Malakoff (1855), Count Randon (1856), Certain-Canrobert (1856), Bosquet (1856), McMahon and Regnaud de Saint-Jean d'Angely, created marshals after the battle of Magenta, and Niel after the battle of Solferino (1859). The title does not occur in the military service of Russia.

FIELDFARE, a European bird of the thrush family, the *turdus pilaris* (Linn.), in form, size,

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proportions of parts, and characters of the plumage, resembling the migratory thrush or American robin (*T. migratorius*, Linn.). The length is between 10 and 11 inches, the extent of wings 17½, the tarsus 1¼, and the weight about 4 ounces; it is a stout bird, and from its long tail and wings rather elegant in form. The bill, which is that of the thrushes, is orange at the base, and brownish black at the end; the inside of the mouth is orange, the edges of the lids yellow, the iris brown, the feet and claws dusky; the head, hind neck, and rump are gray, most of the feathers on the first with a central dusky streak; a space before the eye brownish black, and a whitish line over the eye; the anterior half of the back and the wing coverts are chestnut, shading behind into ash-gray; fore neck and breast yellowish red, with elongated triangular brownish black spots, the sides paler with broadly rounded spots; the lower breast and abdomen grayish white tinged with red; the wings are grayish black, with the edges of the feathers paler; tail deeper black, the lateral feathers grayish toward the end; the lower wing coverts and axillary feathers are pure white, conspicuous during flight. The specific name is derived from a few hairy filaments on the occiput, which are also found in other species, and even in other genera. The female very closely resembles the male. The above is the plumage when it enters Great Britain from the continent; varieties in size and coloring are met with, and albinos are occasionally seen. They arrive in October and November, and some remain until the following spring if the season is mild; they roost in trees if they can, leaving for the fields at early dawn, in parties of from 3 or 4 to many hundreds; their flight is easy but not rapid, and their movements in the trees and on the ground are graceful; they frequent open fields, associating often with other species, and are generally very shy. The food consists of hawthorn and other berries, worms, larvæ, insects, seeds, and grains. They generally disappear in April or May, retiring probably in summer to the north to breed; the nests are built in society, usually in fir and spruce trees, and with the eggs, which are 5 or 6 in number, resemble those of the blackbird. The flesh is considered an excellent article of food, being tender, fat, and of good flavor; this is the species that is supposed to have been so highly esteemed by the ancient Romans.

FIELDING, Copley Vandyke, an English painter in water colors, born about 1787, died in Worthing, Sussex, March 3, 1855. He belonged to a family of artists, and his first picture was exhibited in 1810. He early became a teacher, in which capacity he acquired many pupils and friends. On the death of Joshua Cristall, he was elected president of the old society of painters in water colors, which office he held till his death. Fielding's favorite subjects were either rich wooded landscapes, or ships at sea off a stormy and rock-bound coast. From these two types he seldom varied. His manipulation was peculiar, but it represents atmospheric effects with great freshness. The demand for his works was so great that they were produced too rapidly, and fell into mannerism.

FIELDING, Henry, an English novelist and dramatist, born at Sharpham Park, near Glastonbury, Somersetshire, April 22, 1707, died in Lisbon, Oct. 8, 1754. His father was a grandson of the earl of Desmond, and great-grandson of the first earl of Denbigh, and served under the duke of Marlborough, attaining to the rank of lieutenant-general at the close of the reign of George I. The family of the Fieldings is stated in the English peerages (where the name is spelled Feilding) to be descended from the same ancestry as the imperial house of Hapsburg. Gibbon says: "Far different have been the fortunes of the English and German divisions of the family of Hapsburg. The former, the knights and sheriffs of Leicestershire, have slowly risen to the dignity of the peerage; the latter, the emperors of Germany and kings of Spain, have threatened the liberty of the old and invaded the treasures of the new world. The successors of Charles V. may disdain their brethren of England; but the romance of 'Tom Jones,' that exquisite picture of human manners, will outlive the palace of the Escurial and the imperial eagle of Austria." This eloquent eulogy is as just as it is unique, and the value of the eulogy is enhanced by remembering the prepossessions of its author in favor of rank and position. The early education of Fielding was intrusted to the care of the Rev. Mr. Oliver, a private teacher in Gen. Fielding's family, and who, with what justice we are unable to determine, appears in "Joseph Andrews" under the unenviable character of Parson Trulliber. He received but little benefit from his private tutor, and was sent at an early age to Eton, where he distinguished himself by his brilliant parts, and before his 16th year had made great progress in classical learning, the influence of which is plainly evinced in his writings, and especially in his dramatic works, which are now never acted, and but rarely read. From Eton he was sent to the university of Leyden, where he placed himself under the tuition of the celebrated Vitriarius, professor of civil law. He applied himself with great assiduity to his studies, but did not forget that he was the son of a gentleman; and he led so gay a life that his father, who had taken a second wife, and had a numerous family, found himself unable to defray the cost of his son's extravagance. In his 20th year Fielding was compelled to return to England, and was at once thrown upon his own resources, with a fondness for costly pleasures and but slender means of paying for them. His father had promised him an allowance of £200 per annum; but this, as Fielding said, "any one might pay who would." His vivacity, good humor, and genial wit gained him the companionsip, if not the friendship, of the most eminent wits of his time; and after he arrived in London, while yet a minor, he commenced writing for the stage. His first

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comedy, "Love in Several Masques," was produced in 1727, when he was but 20 years of age. He wrote his dramatic pieces with great rapidity, and threw into them a marvellous amount of wit and satire; but it was only his necessities that induced him to expend his resources in a line which was not in accordance with his genius. As the pay he received was small, the necessity for constant productions left him little time to make elaborate plots, or to pay much attention to the characters of his plays. The "Wedding Day," one of his most successful comedies, gained him but £50, and his vocation of a dramatist brought him in contact with a class of acquaintances who were not calculated to improve either his finances or his morals. In the midst of his gay career, while living from hand to mouth by his pen, and writing the scenes of his plays on the backs of his tavern bills, he formed an acquaintance with a young lady of rare personal endowments, Miss Craddock of Salisbury, whom he married in his 27th year. As his wife had a fortune of but £1,500, the financial condition of the gay dramatist was not much improved by his marriage. Soon after this event he retired to a small estate in the country which he had inherited from his mother, worth about £200 per annum. He was devotedly attached to his young bride, and made serious resolutions of reform. He gave np writing for the stage, having during the brief time that he followed it as a business produced about 20 comedies, farces, and burlesques, only one of which, the burlesque of "Tom Thumb," has kept its place in the theatre. He applied himself with great vigor to literary studies in his country retreat; but he also gave himself up with all the energy of his generous nature to such pleasures as the country afforded, and what with horses and hounds, and entertainments, and open doors for his neighbors, he was soon insolvent, and compelled to return to London to retrieve his fortunes. At the age of 30 he entered himself a student at the Inner Temple, studied diligently, and in due course was admitted to the bar. But repeated attacks of the gout compelling him to abandon legal practice, he again had recourse to his pen. He renewed his connection with the theatre by furnishing dramatic pieces for the stage, and wrote essays, poems, satires, and whatever else the taste of the day demanded, for the literary periodicals that would pay for them. Though he could no longer travel his circuit, he turned his legal acquirements to account by preparing a work on crown law, which evinced his remarkable capacity for patient drudgery. Failing to obtain from these sources the income requisite for his daily wants, he wrote nearly the whole of the literary contents of the "Champion," a periodical which is now only known from his contributions to its columns. But now his genius was first attracted to that sphere for which it was most happily adapted, and in which he was destined to secure an enduring fame. A recent anonymous English writer says: "We had really no novelist in England until Fielding wrote and set the world ever since writing." But this is hardly true, for though one of the greatest of English novelists, he cannot be called the earliest, since his first novel, "Joseph Andrews" (1742), professedly in the manner of Cervantes, was begun as a burlesque on Richardson's "Pamela," which was then the most popular novel of the time. "Joseph Andrews," an inimitable story of English life in the last century, is infinitely better than the author intended to make it, and, if his fame rested upon that work alone, he would be remembered while the language in which it is written endures. In 1743 he published 3 volumes of "Miscellanies," including the "Journey from this World to the Next," a work which, though incomplete, and seemingly without any special plan, exhibits the same strength of imagination and satirical power so splendidly developed in his novels. The "History of Jonathan Wild," which appeared at the same time, is a great storehouse of wit, of profound thought, serious satire, and of benevolence so genuine that even under the guise of the greatest villains that ever disgraced humanity, we are made to love our brother man, vile as he is. The Newgate ordinary in this great prose satire is the representative of the whole class of worldly-minded ecclesiastics, as much so as Macbeth is the type of unscrupulous ambition, or Othello of noble jealousy. Shortly after the publication of "Joseph Andrews," amid an accumulation of illness, broken fortunes, and constant disappointments, he had the misfortune to lose his wife, whom he tenderly loved and most sincerely mourned; though in a few months after her death he married her maid, an act curiously apologized for by his relative, Lady Mary Wortley Montagu. Though he had faithfully served the whig party with his pen, the only reward he received was his appointment, in his 42d year, when his constitution was completely broken, as an acting magistrate for Westminster. He was not content to confine himself to his official duties, but published several tracts on the causes of crime and pauperism in the metropolis, the most remarkable of which may be regarded as the first temperance tract ever published. It was an "Inquiry into the Increase of Thieves and Robbers." Robbery was then frightfully prevalent, and he attributed it to the great consumption of a kind of drink, then in great vogue with the lower classes, called "gin." It was amid all these avocations that he found time to write that greatest of all compositions of its class, the Iliad of prose fictions, "Tom Jones, or the History of a Foundling" (1749). His third novel, the "History of Amelia," wherein he portrays the virtues of his first wife, and the reckless conduct of his own earlier years, and on which he probably bestowed more careful labor than on any of his other productions, was published in 1752. So inconsiderable was his income from his official position,

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and from the sale of his writings, that in this year he was compelled to the necessity of projecting another literary undertaking, which was his last, "The Covent Garden Journal, by Sir Alexander Drawcansir, Knight, Censor-General of Great Britain." He now undertook as magistrate, at the request of the duke of Newcastle, the prime minister, to extirpate several gangs of ruffians which infested London; and in this, amid great bodily suffering, and with very meagre pecuniary aid, he completely succeeded. But it was at length announced that his bodily strength would no longer sustain the burden imposed upon it; the dropsy with which he had long been troubled had alarmingly increased, and by the consent of his physicians and his friends he was induced to try the influence of a change of climate, Lisbon being selected as the most desirable spot for the purpose. But it was too late. He left England on his journey in pursuit of health on June 26, 1754. The journal which he kept of his voyage gives a most touching proof of his affectionate and noble nature in detailing the events of his parting with his saddened family at Fordhook. But, when once away, though suffering great pain, being hardly capable of moving himself, and forced to be continually tapped, his intellect retained all its activity; he made a record of all the incidents of his voyage, and he furnishes us in his journal the best account we have of the condition of shipping in the last century, and of the inconveniences, troubles, and delays those were subjected to who made passages by sea. Unhappily the climate of Lisbon did not agree with him, and he died 2 months after his arrival, leaving behind him his second wife and 4 children; all of whom were most generously provided for by his brother Sir John Fielding, aided by his friend Allen, the original of Squire Allworthy, to whom he dedicated his immortal work of "Tom Jones," and in allusion to whom he had said, if a letter were inscribed simply *Detur Optimo*, there would be few persons who would think it needed any other direction. In personal appearance, Fielding had a commanding presence; he was more than 6 feet high, strongly built, and of most engaging manners. Great as his literary labors were, and the benefits which his writings have conferred upon the world, they were hardly superior in importance to the services he rendered during the brief time he acted as a police magistrate, in reforming the laws, and in introducing measures for the extirpation of thieves and desperadoes.—The works of Fielding have passed through very many editions, the principal of which are those of 1762 (4 vols. 4to. and 8 vols. 8vo., London), with a life of the author; 1784 (10 vols. 8vo.), with an essay on his life and genius, by Arthur Murphy; 1821 (10 vols. 8vo.), edited by Alexander Chalmers; 1840 (imp. 8vo.), with a life, and notice of his works, by Thomas Roscoe; and his "Select Works," with a memoir by Sir Walter Scott (royal 8vo., Edinburgh, 1821).

FIELDING, Sarah, 3d sister of the preceding, and an authoress of some contemporaneous popularity, born in 1714, died, unmarried, in Bath, in 1768. Her principal works are the "Adventures of David Simple in search of a Faithful Friend" (2 vols. 12mo., London, 1744; a 3d vol. added in 1752); "History of the Countess of Delwyn;" "History of Ophelia" (2 vols. 12mo., 1785); and "Lives of Cleopatra and Octavia." In 1762 she published a translation of Xenophon's "Memorabilia of Socrates, with the Defence of Socrates before his Judges," in which she was assisted with notes by Mr. Harris, a gentleman of Salisbury.

FIELDS, James T., an American poet and publisher, born in Portsmouth, N. H., in 1820. He has resided for many years in Boston, before the mercantile library association of which city he delivered an anniversary poem in his 18th year, the orator of the occasion being Edward Everett. In 1848 he read a poem entitled the "Post of Honor" before the same society, Daniel Webster officiating as orator. He is a member of the Boston publishing house of Ticknor and Fields, among the publications of which is an edition of De Quincey's writings, in 21 volumes, prepared under the personal supervision of Mr. Fields. He visited Europe in 1847–'8, and soon after his return, in 1849, published a volume of poems. A similar volume, for private distribution, appeared in 1854, and another in 1858, entitled "A Few Verses for a Few Friends."

FIERI FACIAS, the name of a writ at common law, so ancient that its origin is unknown. By it a sheriff, or other competent officer to whom it was directed, was ordered *quod fieri faciat, de terris et catallis* (or *de bonis et catallis*), "that you cause to be made out of the lands and chattels," or "the goods and chattels of," &c., a certain sum of money, being that to which the party for whom the writ was issued was entitled by the judgment of court; and it may be remarked, that the only regular foundation for the writ of *fieri facias* is a judgment of court. It is in fact the great writ of execution in general, though not exclusive, use throughout the United States, and is often spoken, or at least written of, by way of abbreviation, as a *fi. fa.* By virtue of it the officer to whom it is directed will obtain from the property of him against whom it is directed enough to satisfy the amount of debt or damages and costs, which are always specifically stated in the writ. The rights which this writ confers upon the officer, and the manner in which he is to exercise them, are to some extent matters of statutory regulation. In general it may be said that he must not obtain an entrance by breaking an outer door or window; and it was mainly from this rule that there grew up, with the aid of a little rhetoric, the famous apothegm that "every Englishman's home was his castle." But he may break the outer door of a building disconnected with a dwelling house, as a barn or store; and being peaceably, by voluntary ad-

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mission or by entry without opposition, within a dwelling house, the sheriff may break open inner doors, or chests or boxes, in search of goods; and it is said that he may do this without the ceremony of asking that they be opened for him.

FIESCHI, Giovanni Luigi de', count of Lavagna, a conspirator of Genoa, born there about 1523, drowned Jan. 2, 1547. Wealthy, accomplished, and of high rank, he evinced from his earliest youth an insatiable lust of power, and succeeded in making himself popular with the mob of Genoa. Andrea Doria was at that time the ruler of Genoa, and although Fieschi was not so much opposed to Andrea as personally exasperated against his nephew Giannettino (who was allowed a precedence of rank which was due to himself), he instigated, in concert with Calcagno, Verrina, Sacco, and other discontented politicians, a conspiracy with the view of overthrowing the existing government. The rebellion came to an explosion during the night of Jan. 2, 1547. Giannettino Doria was killed, but his uncle the doge escaped. Fieschi himself was drowned while on his way to the galleys in the port of Genoa, and his death put an end to the outbreak. The life of his widow was spared, but two of his brothers, Geronimo and Ottoboni, were put to death, and the other leaders of the revolt had their property confiscated and were banished by the doge, although an amnesty had been originally granted to them by the senate.

FIESOLE, Fra Giovanni Angelico da, one of the most celebrated of the early Italian painters, born in Fiesole in 1387, died in Rome in 1455. No character in the history of art is more beautiful to contemplate than that of this painter monk. At the age of 20, for the sake of a tranquil life, and particularly for his spiritual benefit, he entered the Dominican monastery of St. Mark at Florence (previous to which time he had borne the name of Guido Petri di Mugello), where he passed the remainder of his days in the devout discharge of his religious duties and the pursuit of his art. A more humble or holy spirit never animated an artist, and from the seraphic beauty of his angels and glorified saints he was called by his countrymen *il beato* (the blessed), and the angelic. He painted only sacred subjects, would never accept money for his pictures, and never commenced them without prayer. The practice of his art was thus with him an act of religion, and to the species of devotional ecstasy with which it was pursued must be ascribed the elevated purity which his works display, and in which they are not surpassed by the most inspired creations of Raphael. Whenever the subject is not in harmony with his gentle spirit he is less successful, and his delineations of human passion or vigorous action are comparatively feeble. He visited Rome at the command of Nicholas V. to decorate the papal chapel. The pope offered to make him archbishop of Florence, a dignity which his great humility would not permit him to accept, but which he succeeded in procuring for a deserving brother monk. He painted frescos in his own monastery and in the church of Santa Maria Novella, at Florence, and numerous easel pictures, of which the Louvre possesses a noble specimen, the "Coronation of the Virgin." In many of the details of his art he was excelled by his contemporaries; but, in the language of Mrs. Jameson, "the expression of ecstatic faith and hope, or serene contemplation, has never been placed before us as in his pictures."

FIÉVÉE, Joseph, a French politician and author, born in Paris, April 8, 1767, died there, May 7, 1839. At first employed in a printing office, he devoted himself also to literature and politics, embraced the principles of the revolution in 1789, and assisted Condorcet and Millin in editing the *Chronique de Paris*. Disgusted with the excesses of the terrorists, he entered in 1795 upon a perilous course of opposition, and shone as an orator in the public assemblies of Paris during the period of the reaction. Proscribed by the revolutionists, he was imprisoned in 1799, and restored to liberty on the 18th Brumaire. In 1802 he was sent by Napoleon upon a delicate mission to England, and on his return published a volume of letters concerning that country which were severely judged in the "Edinburgh Review." He took part in editing several royalist journals, and especially contributed by his skill in polemics to the power of the *Journal des débats*. He wrote several romances, remarkable for grace and simplicity, published a pamphlet in 1795 *Sur la nécessité d'une religion*, which first gave him a leading position in the religious and monarchical party, and left a great number of political treatises.

FIFE, a small instrument of the flute species, consisting of a narrow tube, from a foot to 16 inches in length, perforated on one side with holes for the regulation of the tones, and blown through an opening at the side. It has but one key, and emits a shrill, piercing sound, very effective in military bands, in which it is chiefly employed.

FIFE, or Fifeshire, a peninsular county of Scotland, bounded N., E., and S. by the frith of Tay, the German ocean, and the frith of Forth, and W. by the counties of Clackmannan, Perth, and Kinross; greatest length, 43 m.; greatest breadth, 17 m.; area, 459 sq. m.; pop. in 1851, 153,546. The surface of the county is much diversified. The chief mountains are the Lomond hills, Largo Law, and Normau Law. The soil is of various quality, but so productive in general that fully two-thirds of the whole is under cultivation. During the last half century agriculture has made extraordinary advances in Fifeshire, especially in the department of drainage. In the mountainous districts and on inferior soils oats are the principal crop, but elsewhere wheat, barley, beans, potatoes, and turnips are extensively grown. The Fife breed of cattle have long been celebrated, and are in high repute both at home and in the English markets. Coal, iron, limestone, and freestone are abun-

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dant. The principal manufacture is linen, which is carried on very extensively at Dunfermline and Kirkcaldy. There are salmon fisheries in several of the rivers, and herring, cod, turbot, and haddock fisheries on the coasts.

FIFTEENTH, in music, an interval equivalent to 2 octaves. The term is also applied to that stop of an organ whose tones are 2 octaves higher than those of the diapasons.

FIFTH, in music, an interval embracing 5 degrees of the scale, as C–G, D–A, &c.

FIG TREE (*ficus carica*, Linn.), a native of Asia and Barbary, much cultivated in the warmer portions of the globe. The leaves of the fig tree are rough, lobed, and deciduous. The flowers are so curiously concealed from observation, that many persons think it has none, though they are very numerous, being borne inside of a succulent, hollow receptacle, which first appears on the sides of the young shoots like a small round bud. This receptacle is called a *sycorus*, and on being cut open, the minute, chaffy, apetalous florets, each furnished with 3 stamens and 2 styles, will be seen lining its walls. If these florets have become duly impregnated, the sycorus, after having remained entirely at rest for some time at its half growth, begins to swell again, augments considerably in size, becomes very pulpy and sweet when it ripens, assumes some kind of color, and is the fig. The pulpy, sweet mass will be found to be penetrated with small round seeds, each of which is the result of a minute chaffy floret. The fig tree attains the height of 20 feet, with a branching, spreading head, like an apple tree, in those countries where it is indigenous; but in northern countries it is seldom seen except as a shrub, unless when trained under glass. In the middle states, where cultivated in the open air, it is purposely kept low and shrub-like, so that it may be bent to the ground and covered with earth in winter, to protect it from frosts. In England the tree is usually planted against a low wall, in order that it may receive some of the heat reflected from the surface of the soil. Such walls are sometimes furnished with flues to conduct artificial heat to the ripening crop of figs in autumn. In some parts of France it is grown as a dwarf standard tree, the chief end being to keep the branches short, low, and spreading, in order that they may benefit by the sun's rays reflecting heat from the earth. The soil is manured occasionally and stirred once a year, and some slight protection is given to the lower branches and base of the trunk in the winter. In the south of England it has been treated in the same way with success. Two or more crops of fruit are produced from the fig tree by judicious pruning and training, each crop being produced on distinct sets of shoots. The second crop, for instance, grows from the eyes or buds of the shoots made in early summer, and if the season be sufficiently long and warm, the fruit will ripen; but this seldom happens in the open air. In hot climates it is the second crop that is the most prolific and valuable, being what are called summer figs, and used for exportation. By continued high temperature Mr. Knight has produced in England 8 crops in 12 months, showing at least the remarkable power of the tree.—The fig tree is easily propagated from cuttings, or by ringing some branch and surrounding the cut place by a small pot of earth, into which the roots will penetrate and increase to such extent that the branch may be separated before the fruit upon it has ripened. Branches also girdled by removing a narrow ring of the bark below the fruit-bearing parts, will produce earlier ripening figs, the process being found as safe and efficacious as with the pear tree or the grape vine. It is cultivated to a considerable extent around Boston, Mass., in conservatories and forcing houses such as are used in the cultivation of foreign grapes. Trained upon the back wall of such structures, by using espaliers or by nailing in the branches, a single tree may be made to produce large crops. The branches are spread out horizontally, and so arranged that they can be loosened from the walls, pruned, washed, and cleaned when necessary. Judicious management is important to prevent too great growth of young or useless shoots. By this mode two crops are secured. There are many choice varieties of the fig, each having some peculiar merit. The London horticultural society's catalogue for 1842 gives 42 varieties, and in this number are comprised fruits of white, green, yellow, and brown colors. As an abundant bearer, and hardier than any other, the brown Turkey fig seems to be preferred. Downing considers it the best for the open air, and says that it has a delicious flavor. The brown Ischia, white Marseilles, Brunswick, and white Ischia are highly commended. Mr. J. F. Allen, a successful cultivator, esteems very highly the black fig of St. Michael's. The fresh ripened fig is delicious and luscious. Few, however, fancy it on first acquaintance, but experience soon decides in its favor over the dried and pressed fruit of commerce.—Nearly all the figs consumed in the United States and Great Britain are grown in Turkey. The imports into Great Britain in 1856 were 43,911 cwt., of the computed real value of £83,320; and the imports into the United States during the year ending June 30, 1858, were 4,989,603 lbs., valued at $368,472, of which 159,492 lbs., valued at $16,867, were reëxported to other parts of the western hemisphere.

FILANGIERI, Gaetano, an Italian publicist, born in Naples, Aug. 18, 1752, died July 21, 1788. From 1777 he held various offices at court, and in 1787 he was called to the supreme council of finance. His principal work is the *Scienza della legislazione*, the first 4 books of which were published between 1780 and 1784, and the 5th was left unfinished at his death, caused prematurely by his excessive labors.—Carlo, a son of the preceding, born in Naples in 1783, was indebted for his military education at Paris to the kindness of Napoleon I., fought in the ranks of the French at the battle of Auster-

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litz, served in the Neapolitan army under Murat, and bravely exposed himself to the rifles of the Tyrolese in 1815 by making a reconnoissance at the bridge of the Tannaro with only 80 men, on which occasion he was severely wounded, and appointed general. The late king Ferdinand placed him at the head of the artillery and of the engineers, employed him in 1848 in bombarding Messina and in quelling the rebellion in other parts of Sicily, and as governor-general of that island, he invested him with unlimited power. Shortly after the death of Ferdinand, he became Neapolitan premier and minister of foreign affairs (June, 1859).

FILBERT (*corylus Avellana*, Willd.), a term applied to those sorts of hazelnuts which have very large husks. The original species is a native of Europe, and derives its specific name from Avellino, a city of Naples, near which it grows in great abundance. The common hazelnut also grows wild in many coppices and woods in Britain. The name of *corylus* comes from the Greek κορυς, a bonnet, to which the enwrapping calyx may very well be compared; and hazel is from *hæsel* (Anglo-Saxon), which signifies a kind of head dress. The fruit of the filbert (fill-beard) is 3 or 4 times as large as that of the common hazelnut, and surpasses it in flavor. The shrub is raised from layers made in the spring; but scions will grow if engrafted upon the hazel. It is recommended to extirpate all the suckers from the roots, and to keep the bush down by giving it a low, spreading, rather thin head, branching out about 2 feet from the ground, and shortening back the extremities of the young shoots one half every spring. The most esteemed varieties among cultivators are only 4 or 5 in number, viz.: the frizzled filbert, easily known by its handsome, deeply cut husk; the Northamptonshire prolific, with a thick shell, hairy husks, and ripening early; the cobnut, a very prolific kind; the Cosford, with a large, oblong nut, hairy husks, remarkably thin shell, and of excellent flavor. The filbert grows best in a good soil, tolerably dry, and occasionally manured. In Great Britain, the filbert is chiefly cultivated for the London market in that part of Kent where the soil is a loam upon a dry sandy rock. The filbert is monœcious; that is, it bears barren flowers in the form of aments or catkins, beneath which, on the same branches, the fertile flowers may be perceived. Failure in the crops is sometimes attributable to the loss of the aments by injudicious pruning or by frosts, to guard against which it is recommended to allow unpruned, wild specimens to grow among the better kinds; these prove of value in impregnation, and, being hardier, do not suffer from unusual cold. In the United States, so far as we are informed, the filbert is only found in collections of curious shrubs and trees, and is not cultivated to any extent. The value of the filbert in the neighborhood of London may be estimated by the fact that as many as 30 cwt. per acre have been grown on particular lands. The filbert is represented in Turkey and Asia Minor by *C. colurna* (Linn.), the Constantinople hazel, which rises to a tree of 50 or 60 feet in height, growing rapidly and with great vigor in the climate of London, having been introduced into England in 1665. A smaller tree of 20 feet in height is found in Asia, a native of the top of the mountain Sheopur in Nepaul, with a small nut, having an exceedingly hard shell, and of a sweet flavor, described by Wallich as the *C. ferox*, the edge of the calyx being remarkably laciniate and shaggy.—In the American flora the filbert is represented by two species, both shrubs, and producing small, sweet kernels. The most common is *C. Americana* (Walter), a branching bush from 3 to 6 feet high, with coarse leaves, broad-ovate or elliptical, acuminate, heart-shaped at base, irregularly serrate on their edges. It is one of the earliest blooming plants, flowering about the same time with the black alder. It may be found along fences, stone walls, and among bushes and weeds in neglected places, having pale gray aments, which elongate and shed the abundant yellow pollen, to fall upon the little starry, crimson, fertile flowers, which project in small clusters from the sides of the branches and just below. The nut is about ½ of an inch in breadth and rather less in length, covered with 2 broad leaves much larger than the nut, deeply and irregularly cut and fringed on the border, and turning brown when mature. Some accidental varieties are said to equal the European filbert in size; and the flavor of the American hazelnut is preferred by some tastes. There is another wild species, not so common, called the beaked hazel (*C. rostrata*, Aiton), a smaller shrub, with pear-shaped leaves, irregularly serrate, smooth above, hairy or downy beneath. The nut is small and roundish, having a bristly husk closely set about it, which lengthens into a jagged beak, whence its common name. According to Dr. Richardson, this species extends as far north as the Saskatchewan, in Canada. It occurs also upon the highest Alleghanies, and even in the S. W. part of the United States.

FILE, a bar of steel, roughened by lines upon its surface, and used for wearing down the face of metals, or fashioning these into various shapes. If the instrument is cut with only one set of lines, which form a succession of parallel ridges across it, it is said to be single cut, and is called a float; if roughened by triangular teeth or burrs, which are pushed up from the face of the metal by a pyramidal sharp-pointed chisel, it is called a rasp. The latter is used for working down wood; floats are preferred for copper and other metals of inferior hardness; while the double-cut files, made by two sets of lines crossing each other, are best adapted for taking hold of the hardest metals. Files are applied to such a variety of purposes, from the heavy work of machinists to the delicate operations of the watchmaker, that they are found in a great number of forms and sizes. Some are 2 or even 3 feet in length, while others do not exceed ¾ of an inch. Their patterns, though numerous, are

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mostly limited to certain established classes of forms, of which 3 are recognized, distinguished by the cross sections of the bar, viz.: those derived from the square, from the circle, and from the equilateral triangle. The common names of square, round, half-round, three-square, &c., are given from the form of the section of the bar. In its length also various modifications are given to the shape of the bar, by which many forms of files are distinguished. Taper files are drawn down and terminate in a sharp point; parallel files are made of a uniform size throughout their length; and blunt files are intermediate between these. Files of the different classes of cross section are subject to these modifications. Then they are variously designated according to the number of lines cut to the inch, an established number being adopted by the English file makers for each length of file; the coarsest are called rough, the next bastard, the third smooth, and the last dead smooth or superfine. Other varieties are produced by leaving an edge or side or other portion smooth, or safe, as it is technically called, thus adapting the files for working in angles and recesses without cutting away portions it is desirable to preserve. The smooth part serves sometimes as a guide by which the file is directed. For the sake of economy an inferior blistered steel is commonly used for the heavier files, but for the finer ones the best cast steel is selected, rolled in rods approaching the dimensions of the files. The large flat files are drawn down from the bars upon the face of the anvil, one man striking with a heavy hammer and the other with a small hand hammer. The three-square, half-round, and many other forms are shaped from square rods, the end of one, heated to blood-red, being laid along in a die which is set in the anvil, and then hammered in until it fills it and receives its form, the hammers shaping the top side. The die of the half-round files presents a section of the segment of a circle; that of a triangular file is formed by two sides of a triangle meeting at the bottom. The square rod is placed with one edge down in this channel, and is then hammered into place and shape. Before the process is completed the tang also is shaped out of the blank. The next operation is to anneal the blanks, so as to soften the steel for receiving the impressions of the chisel used to cut the lines. This is commonly done in a brick annealing oven; sometimes by heating the blanks buried in sand in an iron box, the heat not being allowed to exceed a blood red. They are then smoothed upon the face, the small blanks by filing, the large ones by grinding, and sometimes those with parallel faces by planing. The blanks are then ready for the file cutter, who, seated astride of a low bench, has in front of him an anvil of size proportionate to the files he cuts. Taking one of these, he lays it, if flat, directly on the smooth face of the anvil, the end pointing toward him. The file is kept in place by two leather straps, one passing over each end, which are held down by the feet. Files other than flat, and all that have been cut on one side, are held upon a block of soft alloy of lead and tin, adapted by grooves or otherwise to hold the blanks with the upper side properly presented for receiving the cuts. The chisels used for this purpose are very short for the sake of stiffness and for being conveniently held in the fingers of the left hand, and they have an edge longer than the width of the face to be cut, sharpened to an angle of about 20°. One being placed upon the blank at the further end of the file, it is held inclined toward the person at an angle of 12° or 14° from the perpendicular, and is then smartly struck with the hammer held in the right hand. A groove is thus cut across the blank with any desired obliquity, and a ridge of steel turned up; the chisel is then brought forward and slid from the operator until it reaches the ridge just made, which determines the position of the next cut, which is instantly given by another blow. Thus the blows and the cuts are made at the rate of 60 to 80 in a minute, their parallelism and uniformity being secured by the guiding ridges and by uniformity in the force of the blows. The heavier the blows, the deeper the cuts and the higher the ridges are thrown up, thus involving coarser work. The hammers vary greatly in weight. The coarse files require them to be of 7 or 8 pounds, and the finest ones are made with hammers of one to two ounces only. Great practice is required always to give the blows of equal force for insuring uniform work. When the face of the blank is gone over once the process is repeated for double-cut files, the chisel being held so as to cause the two sets of lines to cross each other obliquely. The blows are lighter, so that the second set is finer than the first. As the small ends of taper files will not bear the blows struck upon the middle of them, the work is commonly finer at their extremities. Files with curved surfaces are cut with the same sort of chisels as those with plane surfaces, a row of short cuts being first made the length of the file, then another row whose ends connect with those of the first row, then a third, and so on till the cuts meet around the cylindrical file or cover the curved surface of the section of the cylinder or cone. The fine round files sometimes require as many as 20 rows of cuts to encircle them, and an inch of the file may contain 100 cuts. The burrs upon rasps are punched up by a similar hand process. The workmen acquire great skill in raising them in true lines, and in bringing each one opposite a vacant space in the adjacent lines. The directions of the lines vary according to the purposes for which the rasps are required.—After the files are cut they are to be hardened—a process which requires experience and dexterity. The teeth must be protected from the direct action of the fire, or they will become oxidized and roughened. The files must be heated uniformly throughout, and not beyond a cherry red. They must be cooled in clean cold water, with particular care in immersing them to prevent their cooling so unequally as to

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be warped from a straight line. Long thin files are particularly liable to this, as also the half-round, and the defect is afterward corrected with difficulty. To protect the teeth in fine files they are first covered with a strong brine, thickened with beer grounds, yeast, or some cheap kind of flour, as that of beans. As this dries, the salt melts uniformly over the surface. The carbonaceous matter is thought to increase the hardness of the steel, but animal charcoal, as that of burnt leather, horn, &c., which is used by some makers, is better adapted for this object, and probably the prussiate of potash may prove still better. The temper of the tang is brought down by immersing it in melted lead. After hardening, the files are thoroughly cleansed by scouring with sand and water, and the salt is got rid of by leaving them some hours in lime water. They are then well dried, rubbed over with olive oil containing a little turpentine, tested with a piece of steel, sorted, and packed in papers for the market.—A variety of machines have been invented to take the place of hand labor in cutting files. Some of these, as that patented by Capt. Ericsson in 1836, were made with great ingenuity, and when introduced into large establishments, as this was in the works of Messrs. Turton and sons of Sheffield, each machine was found to do the work of nearly 10 men; but so many difficulties have been met with in their use, that they are for the most part entirely given up. A machine has recently been patented in England by M. Lacroix, which is recommended as embracing every motion requisite for cutting files, producing the varying degrees of fineness, the blows of different force, the various inclinations of the chisels, and all the other devices required in cutting the different kinds of files. In the London exhibition of 1851, a Prussian machine of this class was exhibited, and the display of hand-cut files from France, Austria, and other portions of Europe showed that the art was carried to a high degree of perfection in other countries beside England. The following is recorded of the Danish articles of this class: "In the Danish department was a series of files manufactured of cast steel by J. W. Naylor of Copenhagen. The largest file, which was square, was covered with a series of file cutter's cuts, representing on one face the city of Copenhagen, on another face the operations of the forge and of file cutting, &c. These effects were entirely produced by the file cutter's chisel; the effect of color and shading being given by the various angles of the teeth reflecting the light at different degrees of obliquity. The teeth of a large circular file were cut so as to represent, in a spiral going several times round the file, the maker's name, the date, wreaths of flowers, &c. This file was hollow, and contained within it a second hollow file, which in its turn contained 10 others, all ornamented with wreaths, &c. The smallest file was not larger than a small needle." In the United States the manufacture of files is successfully conducted in several localities; among which may particularly be named the works of Mr. John Russell at Sing Sing, on the Hudson.

FILICAJA, Vincenzo da, an Italian lyrical poet, born in Florence in 1643, died there, Sept. 24, 1707. He studied theology, philosophy, and jurisprudence, was appointed to several civil offices, and was made senator and governor of Pisa. His poems are distinguished for their patriotic and religious sentiments, and their purity of style. An ode which he composed after the raising of the siege of Vienna by the Turks in 1683 gained for him the felicitations of several European sovereigns. The abdication of Christina, queen of Sweden, induced him to write a poem in praise of that princess, and he afterward received many favors from her. One of his sonnets, entitled *L'Italia*, is esteemed among the most admirable in the Italian language.

FILIGREE (It. *filigrana*, from Lat. *filum*, wire, and *granum*, a grain), ornamental work in fine gold or silver wire, often made with little metallic beads or grains interspersed among the wires. The work may be complete in itself, or it may be used, as is the common method, by applying the wire in flattened and twisted shapes upon the surfaces of the trinkets or whatever else it is designed to adorn, and soldering it there in the patterns of stems and leaves of plants. It is much practised by the Italians, who derived the art from the eastern nations. Fine specimens of it were seen at the great exhibition of 1851, in London, from Sardinia, Turkey, the Ionian islands, and Malta. The inhabitants of Sumatra are very expert in it, working with the rudest sort of tools. The leaves to be attached to the roughened wires, which represent the stems, are hammered out of these same wires and clipped off their ends, when they are arranged in their proper places and soldered down.

FILLIBUSTER. The river Vly in Holland is said to have furnished the name flyboat in English, in Spanish *flibote*, or by a softening of the first syllable *filibote*, to a sort of small fast-sailing vessel of about 100 tons burden, which in the 17th century held in point of sailing qualities the place now occupied by the Baltimore clippers. The buccaneers of the West Indies, who began their depredations against Spanish commerce in mere row boats, as they acquired the means for a more formidable outfit, selected these vessels as the sort of craft best suited to their purpose. Hence they became known in French as *flibustiers*, and in Spanish as *filibusteros*, an appellation gradually extended in those languages to any kind of pirates. The term fillibuster has recently been introduced into the English language—its use commencing in New Orleans, but thence rapidly spreading wherever English is spoken—as a designation for certain adventurers who since the termination of the late war between Mexico and the United States have busied themselves with setting on foot within the United States military expeditions designed to operate in the Spanish American countries to the south of us.

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The pretence of these expeditions has been the emancipation of those countries from tyranny foreign or domestic, and the introduction of democratic institutions after the model of the United States. The real object is generally understood to be the enrichment of the persons engaged therein by a reënacting of the part of the original Spanish conquerors. The setting on foot of such expeditions is prohibited by our neutrality laws, but in Mobile and New Orleans they have been a great deal encouraged by a prevailing sentiment in their favor. Thus the laws have been frequently evaded, and where violations of them have been prosecuted the parties have often escaped conviction. The most noted expedition of this sort hitherto was that led by William Walker against Nicaragua in 1855, to the pecuniary expenses of which, at least toward the close of it, several large capitalists are understood to have contributed. By means of a military force recruited from the United States, Walker was for some months master of the country; from which, however, after maintaining himself in it for nearly two years, he was finally expelled by the union against him of the other Central American states. Similar designs are understood to be still entertained against Cuba and Mexico. Though expeditions of this sort are regarded in some portions of the United States with favor, and are countenanced to a certain extent by men of position and character, the parties actually participating in them have consisted largely of foreigners.—Fillibustering is a cant term much used of late years in the legislative assemblies of the United States to designate the employment of parliamentary tactics to defeat a measure by raising frivolous questions of order, calls of the house, motions to adjourn, &c., in order to weary out the opposite party, or to gain time.

FILLMORE, a S. E. co. of Minnesota, bounded S. by Iowa; area about 900 sq. m.; pop. according to incomplete returns in 1857, 6,595. It is intersected by Root river and its branches, and has a rolling surface and an excellent soil, well adapted to grain, potatoes, and pasturage. Capital, Preston.

FILLMORE, Millard, 13th president of the United States, born in the township of Locke (now Summerhill), Cayuga co., N. Y., Jan. 7, 1800. He was the 2d of the 9 children of Nathaniel and Phœbe Fillmore. Cayuga co. was at that time a wilderness, broken by a few pioneer settlements. The nearest house to that of the Fillmores was 4 m. distant. Young Fillmore's education was limited to instruction in reading, writing, spelling, and the simplest branches of arithmetic. He never saw either a grammar or a geography until he was 19 years of age. At 14 he was apprenticed to learn the fuller's trade, and the next 5 years were devoted to dressing cloth, carding wool, and to labor upon his father's farm. A portion of each winter was also spent in attending the rude common schools of the country. In 1819 his father removed to Aurora, in Erie co. Being left in Cayuga co., he conceived the design of studying law. The laws of New York then required 7 years' preparation for admission as attorney from those who had not received a classical education. Fillmore had yet two years of his apprenticeship to serve. He agreed with his employer to relinquish his wages for his last year's services, and to pay him $30 for his time. His master took his promise to pay and released him. At the same time he made with Walter Wood, Esq., a retired lawyer, who possessed a law library, an arrangement by which he was to receive his board during such time as he should devote himself to Mr. Wood's private business. Blackstone and Tidd's "Practice" were placed in his hands, and he gave his leisure time to an uninstructed and bewildered study of their contents, wondering why, in America, he should be put to reading the laws of England. Three months of the next winter were devoted to teaching school. The entire product was $36, of which $30 fulfilled his promise to his master; the remainder had to suffice for the year's expenses, except board. At the age of 20 he was invited by his fellow citizens to deliver the 4th of July oration for that year, and succeeded so well that he was requested to publish it; a request which, after consulting Judge Wood, he modestly and with characteristic caution declined. At 21, concluding that he never should learn his profession by attending to Judge Wood's affairs in summer and teaching school in winter, and being desirous to be near his family, he removed to Buffalo. The journey was performed mostly on foot. He arrived there an entire stranger, with $4 in his pocket. His only resource was keeping school. During his first winter's residence at Buffalo, he rose while it was yet dark, swept the law office in which he was permitted to study, built his own fire, and studied law till breakfast time. He knew no Latin; his English education was hardly begun; each line was read faithfully over and over again, and firmly impressed upon the memory. Nothing was passed until it was thoroughly understood. The day was devoted to school-keeping, the evening to discussing the subjects of the morning's study with a fellow student. The succeeding winter was still more laborious. His school was 2 miles from the village. The postmaster being absent, Fillmore was employed temporarily to perform a large share of the duties of the office. He rose in winter in time for the 4 o'clock morning stage which passed by his school house; made his fire, swept his school room, and studied law alone and by candle light till breakfast. The day was spent in school; the evening till late at night with mails and post office accounts. By the spring of 1823 he had so far gained the confidence of the bar, that by the intercession of several of its leading members he was admitted as an attorney by the court of common pleas of Erie co., although he had not completed the period of study usually required. He purchased a few

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law books for $39, payable in 3 annual payments of $13 each, secured by a mortgage on the property; and placing a box which contained all his effects on a farmer's wagon, he accompanied it on foot to Aurora, where his father then resided, and where (in 1859) he still lives. Here he commenced the practice of law. Business was small, but large when compared to the pay received for it. There was time however for hard study, and none of it was lost. In the course of a few years Mr. Fillmore acquired not only a large practice, but a thorough knowledge of the principles of the common law, which placed him in the first rank among the lawyers of the state of New York. The first fruits of his profession were punctually paid to Judge Wood in full of a small advance made by him to Mr. Fillmore while he was in his employ, and which was the only pecuniary aid he ever received after he was 14 years of age. In 1826 he married Abigail, the daughter of the Rev. Lemuel Powers. In 1827 he was admitted as attorney and in 1829 as counsellor of the supreme court of the state. In 1830 he removed to Buffalo, where he continued in the practice of the law until the autumn of 1847, when he was elected comptroller of the state, and retired from the profession. Shortly after he was established in Buffalo he associated with himself in business Nathan K. Hall, who had studied law with him, and who was afterward U. S. postmaster-general, and is now (1859) U. S. district judge for the district of New York. Solomon G. Haven, afterward member of congress from Erie co., was a student in their office, and was subsequently taken into partnership.—Mr Fillmore's political life commenced in 1828, when he was elected representative to the state legislature by the anti-masonic party. He served 3 successive terms, retiring in the spring of 1831, and sustaining while in the legislature a high reputation for integrity, candor in argument, thorough investigation, and the faithful performance of the minutest details of every duty. He particularly distinguished himself by his advocacy of the act to abolish imprisonment for debt, which was passed in 1831, and which was drafted by him, excepting the portions relative to proceedings in courts of record, which were drawn by the Hon. John C. Spencer.—In the autumn of 1832 he was elected on the anti-Jackson or anti-administration ticket to congress. After serving one term he retired till 1836, when he was reëlected to the same position as a whig. He was chosen again in 1838, and again in 1840. In 1842, although he had previously written a letter declining to serve another term, he was unanimously renominated by the whig convention of his district, and it was with difficulty that he obtained leave from his constituents to retire from the public service. In congress he rose gradually to the first rank for integrity, industry, and practical ability. During the early part of his congressional career a national bank was the prominent subject of discussion. Mr. Fillmore was never a warm friend of the bank, and took no part in the debates upon it. He was, however, a decided whig, and labored earnestly in support of the internal improvement and protective tariff policy of that party. In the struggle which took place upon the question of the reception of petitions for the abolition of slavery in the 25th congress, he supported Mr. Adams, and voted for their reception. In a letter written to certain of his constituents, Oct. 17, 1838, he distinctly avowed that he was opposed to the annexation of Texas so long as slaves should be held therein; that he was in favor of congress exercising all its constitutional powers to abolish the slave trade between the states, and in favor of immediate legislation for the abolition of slavery in the district of Columbia. He expressly stated, however, that he would not pledge himself as to his future course upon any of these subjects; but reserved the right to modify or change his views, as upon further reflection or examination he might deem proper. Mr. Fillmore took a prominent part in the debates in congress upon the subject of the burning of the steamer Caroline by British troops at Schlosser, on the Niagara frontier, in Dec. 1837. On Dec. 2, 1839, at the opening of the 26th congress, the clerk commenced calling the roll of members. When he came to New Jersey (whose members were then elected by general ticket), he stated that the seats of 5 of the 6 members from that state were contested; that he did not feel authorized to decide the question of their right to their seats, and that he should therefore pass over their names, and proceed with the call. The election of these members was certified to by the governor of New Jersey, under the broad seal of the state. It so happened that these 5 members were all whigs. Parties were so evenly balanced in the house, that if these 5 members were admitted at once it would give the whigs control of its organization, including the election of speaker, while if they could be deprived of their seats until the house should be organized, its organization would be controlled by the democrats. The whigs contended that the certificate of the governor, authenticated by the seal of the state, should be received as presumptive evidence of the right of the 5 members to their seats; that they should be permitted to participate in the organization of the house, and that afterward the claims of contestants to their seats should be investigated in the ordinary course of business. The democrats insisted that the house should decide the question before electing a speaker. A violent debate arose. The house remained in a disorganized and confused condition until Dec. 5, when Mr. Adams was chosen temporary chairman. Two weeks were consumed in discussing the question whether the 5 New Jersey members should be permitted to participate in organizing the house. A resolution to admit them was lost by a tie vote. A speaker was chosen on Dec. 16, and the discussion then resumed. Mr. Fillmore was assigned a place on the committee on elections.

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He canvassed the entire vote of the state of New Jersey, devoting 3 months' time to this repulsive drudgery. A majority of the committee, being democrats, reported that the 5 contestants, also democrats, were entitled to the seats, to the exclusion of the 5 whigs, who held the certificate of the governor. The minority of the committee, among whom was Mr. Fillmore, were satisfied that 3 at least of the whig members were unjustly excluded by the majority report. On March 6, by a strict party vote, overruling the decision of the speaker, Mr. Fillmore was declared to be out of order while supporting his views on this question, and all further debate was substantially prohibited. On March 10 the democratic contestants were admitted to their seats, and their title to them confirmed by a party vote on July 16. This brief history of the celebrated New Jersey case is given in this place, as Mr. Fillmore was one of the most prominent actors in it, and by his labor in the committee and zeal in debate upon the questions involved, added greatly to his reputation throughout the country. Hitherto Mr. Fillmore had always been in a minority in the national councils; but the whig party was largely in the majority in the 27th congress, which assembled in 1841. A new financial system, and an entirely new tariff, were to be devised and put in operation. Under the circumstances the position of chairman of the committee of ways and means was the most arduous, the most responsible, and at the same time the most honorable place in the house. It was assigned to Mr. Fillmore, and he devoted himself to the performance of its duties with even more than his accustomed industry. The session continued 9 months, during which time he was not absent a single hour from the house, though he did his full share of the labors of the committee. The preparation of the new tariff bill involved an examination, digestion, and arrangement of figures and statistics appalling to any but a mind strengthened by years of toilsome investigations. Although Mr. Fillmore did not profess to be the discoverer of any original system of revenue, still the tariff of 1842 was a new creation, and he is justly entitled to the distinction of being its author. At the same time, with great labor, he prepared a digest of the laws authorizing all appropriations reported by him to the house as chairman of the committee of ways and means, so that on the instant he could produce the legal authority for every expenditure which he recommended. Sensible that this was a great safeguard against improper expenditures, and one that was likely to be neglected, he procured the passage of a resolution requiring the departments, when they submitted estimates of expenses, to accompany them with a reference to the laws authorizing them in each instance. This has ever since been the practice of the government. Mr. Fillmore retired from congress in March, 1843. He was the candidate for the vice-presidency, supported by his own state and by some of the western states, in the whig national convention which met at Baltimore, May 1, 1844. In the convention of the whigs of the state of New York, which met Sept. 11, he was nominated for governor by acclamation, but was defeated by Silas Wright, Mr. Clay being defeated at the same time in the presidential election by Mr. Polk. —In 1847 Mr. Fillmore was elected comptroller of the state of New York, an office which at that time included in its sphere many duties now distributed among various departments. In his report of Jan. 1, 1849, he suggested that a national bank, somewhat upon the plan of the free banking system of New York, with the stocks of the United States as the sole basis upon which to issue its currency, might be established and carried on so as to prove a great convenience to the government, with entire safety to the people. His suggestions have since been approved by many of our most eminent financiers of different political parties.—In June, 1848, he was nominated by the whig national convention for the vice-presidency, with Gen. Zachary Taylor for president; and was elected in the ensuing November. In February he resigned the office of comptroller, and on March 5, 1849, was inaugurated as vice-president. When congress met in December, California presented itself for admission into the Union, under a constitution excluding slavery, framed without legal authority, by a convention of its people. There being at this time an equal number of free and slave states in the confederacy, the proposition to admit California and thus destroy the balance of power in the senate in favor of the free states excited throughout the South the most violent opposition, founded in part on the irregular manner in which its constitution had been framed. At the same time, Deseret, now Utah, and New Mexico, were without a government; while the boundary between the latter and Texas was in controversy, and Texas was threatening to take possession of the disputed territory by force. President Taylor, in his message, recommended the admission of California, and that congress should await the action of the people of the other newly acquired territories and admit them in the form of states, with or without slavery, as their constitutions should prescribe. He made no suggestions, however, for the government of the territories in the mean time, nor for the settlement of the boundary line between Texas and New Mexico. To reconcile the South to the admission of California, Mr. Clay introduced his famous "omnibus bill." (See CLAY, HENRY.) The whig party was divided, a portion supporting the policy of President Taylor, and a portion that of Mr. Clay. The debates in the senate were extremely acrimonious. A violent agitation ensued throughout the Union. Threats of secession in case of the admission of California were made by southern statesmen even of the moderate and conservative school; and many persons, not hitherto deemed timid men, were exceedingly anxious and alarmed as

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to the result. Scenes of violence occurred in the senate. In 1826 Mr. Calhoun, then vice-president, had established the rule that that officer had no power to call senators to order. Mr. Fillmore in a speech to the senate announced his determination to preserve order, and that, should occasion require, he should reverse the usage of his predecessors upon that subject. This announcement met with the unanimous approval of the senate, which ordered Mr. Fillmore's remarks to be entered at length on its journal. He presided during the controversy on the "omnibus bill" with his usual impartiality. No one knew which policy he approved, excepting the president, to whom he privately stated that should he be required to deposit his casting vote, it would be in favor of Mr. Clay's bill. Over 7 months of the session had been exhausted in angry controversy, when, on July 9, 1850, President Taylor died. Mr. Fillmore took the oath of office as president on July 10; President Taylor's cabinet at once resigned, and a new cabinet was nominated on the 20th. Mr. Fillmore immediately ordered a military force to New Mexico, with instructions to protect that territory from invasion by Texas. Mr. Clay's bill having been in the mean time defeated, the president, on Aug. 6, sent a message to congress advising that body of the danger of a collision with Texas, and urging a settlement of the controversy in respect to its boundary. Various acts, known as the compromise measures, and embracing substantially the provisions of Mr. Clay's bill, were passed before the end of the month. The president referred to the attorney-general the question whether the act respecting the rendition of fugitive slaves was in conflict with the provisions of the constitution relating to the writ of *habeas corpus*. That officer prepared a written opinion in favor of its constitutionality. The president concurred in this opinion and signed the act, together with the rest of the compromise measures. The fugitive slave law was exceedingly offensive to great numbers, if not to a majority, of the whig party of the North, as well as to those known strictly as anti-slavery men. Its execution was resisted, and slaves were rescued from the custody of the marshals by mobs at Boston, Syracuse, and Christiana in Pennsylvania, in the last of which places one or two persons were killed. The president announced his intention to enforce the law, and issued a proclamation calling upon all officers to perform their duty in its execution. Prosecutions were instituted in various instances against the rescuers, but without practical results, owing to the unpopularity of the law. Although it was known that the president was in favor of the compromise measures as a whole, and selected a cabinet entertaining the same views, yet, in pursuance of a general rule which he had laid down for his official action, he did not seek to exercise any influence in their favor, nor did he assume any responsibility in respect to them, excepting such as strictly belonged to his duties as president. They were substantially approved by resolutions passed by the democratic and whig national conventions of 1852, and by most of the leading politicians of the country north and south, and there has been no serious effort made to repeal them. But there were thousands of whigs as well as others in the North whom no constitutions nor considerations of political expediency could reconcile to a law, by the provisions of which the whole force of the government was to be employed in rendering fugitives back to bondage. Although Mr. Fillmore's administration, as a whole, was acknowledged to be patriotic, able, and useful; although his purity as a public man was unquestioned, and not a single other measure of his administration could be called unpopular; it nevertheless cannot be doubted that Mr. Fillmore by signing the fugitive law not only afforded a pretext for the opposition of his enemies, but lost the support of a very large proportion of his party in the northern states. In his message to congress in Dec. 1850, the president recommended a reduction of inland postage to 3 cents on each letter when prepaid, and 5 when not; and also a reasonable reduction on printed matter. He also urged congress to provide a supply of water for the city of Washington. These recommendations were adopted. He also recommended the establishment of an agricultural bureau; liberal appropriations for rivers and harbors; the establishment of an asylum for the relief of disabled and destitute seamen; a moderate but permanent tariff, with specific duties where practicable, and discriminating justly in favor of American industry; the opening of communication between the Mississippi and the Pacific; a provision for settling disputed land titles in California, and an extension of the system of land laws over the newly acquired territories; a law to provide for the retiring of superannuated officers from active service in the army and navy; a board of commissioners for the adjustment of private claims against the government; and, in conclusion, "an adherence to the adjustment established by the compromise measures, until time and experience should demonstrate the necessity for future legislation to guard against evasion or abuse." But his administration being in a political minority in both houses of congress, none of these recommendations calling for action were adopted, excepting those for the settlement of land claims in California, and the survey of its public lands, and for an asylum for disabled and destitute seamen. During this session congress made an appropriation for the extension of the capitol according to such plan as might be approved by the president. Having adopted a plan, on July 4, 1851, he laid the corner stone of the extension, amid an immense concourse of people, who were addressed by Daniel Webster. Learning that an attempt was to be made to invade Cuba by lawless citizens of the United States, the president on April 25,

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1851, issued a proclamation warning them of the consequences. On Aug. 4, however, an expedition under Lopez, in the steamer Pampero, sailed from New Orleans by the connivance of the collector of that port and landed in Cuba. They were there captured; some were executed, a few pardoned, and the remainder sent prisoners to Spain. Those sent to Spain were finally pardoned, and congress paid their expenses home. The collector of New Orleans was removed from office, and the steamer Pampero seized by the government, and condemned and sold for a violation of the neutrality laws. During the same summer information was privately communicated to the president which led him to suspect that a Dr. Gardner had presented a fraudulent claim to the Mexican commissioners, which had been maintained by forgery and perjury, and allowed, and on which he had drawn from the treasury nearly $500,000. A prosecution was immediately instituted, Gardner was convicted and committed suicide, and a large portion of the money obtained by him was recovered. In his message of 1851, beside reiterating the views expressed in that of 1850, the president urged a revision of the fee bill of the U. S. courts, a thorough revision and codification of the laws of congress then in force, and a law prescribing the relative rank of officers in the army and navy. Mr. Fillmore's administration is distinguished by the expedition of Commodore Perry to Japan, in a squadron which sailed in the autumn of 1852, and which resulted in a favorable treaty with that country. During the years 1851 and 1852 treaties were also formed with Peru, Costa Rica, Brazil, and other South American states. A steamer was sent to explore the La Plata and its confluents. Believing, from the gold purchased on the coast of Africa, that there must be large deposits of that metal in its interior, and in the hope that the discovery of large quantities of gold there would result in the prosperous emigration of many of the free colored people of the United States, Mr. Fillmore despatched an expedition under Lieut. Lynch, with instructions to explore the interior of Africa, and, if possible, to ascertain the location of its gold deposits. This expedition, it is understood, failed on account of the sickness of the commander. Another exploring expedition under Capt. Ringgold was despatched by order of congress into the Chinese seas. An expedition was also ordered by the president to explore the valley of the Amazon. This accomplished its object, and instructive reports were made by Lieuts. Herndon and Gibbon. Mr. Fillmore carried out strictly the doctrine of non-intervention in the affairs of foreign countries, and frankly stated his views upon this subject in an interview with Kossuth. At the same time, however, it appeared clearly enough by the celebrated letter of Mr. Webster, secretary of state, to M. Hülsemann, how little the administration sympathized with Austria in its struggle with Hungary. The British man-of-war Express having fired into the American steamer Prometheus at San Juan, an ample apology was required and given in a letter by Lord Granville, Jan. 16, 1852. In the autumn of 1852, Mr. George Law of New York city claimed the right to send to Cuba in the steamer Crescent, owned by him, an individual obnoxious to the Cuban authorities. They would not permit the vessel to land. Mr. Law proposed to seek redress by force. In a letter to the collector of New York, dated Nov. 12, 1852, Mr. Fillmore stated that the controversy was one to be settled by the government, and not by a private citizen, and that should Mr. Law attempt to obtain redress as a private citizen by force, the whole power of the government would be interposed to prevent it. This letter, at Mr. Fillmore's request, was communicated to Mr. Law, who desisted from any further warlike demonstrations. Mr. Webster died Oct. 24, 1852, and Mr. Edward Everett was appointed his successor as secretary of state. His brief term of office was distinguished by his letter declining the proposition for a tripartite treaty with England and France, by which each country was to disclaim then and for the future all intention to obtain possession of the island of Cuba. But in his message to congress in Dec. 1852, the president expressed his opinion that the incorporation of Cuba into the Union would be a hazardous and impolitic measure. Mr. Fillmore retired from the presidency March 4, 1853. He left the country at peace within and without, and in the enjoyment of a high degree of prosperity in all departments of its industry. In his cabinet there had never been a dissenting voice as to any measure of his administration; and upon his retiring from office, a letter was addressed to him by all its members, expressing their united appreciation of his abilities, his integrity, and his devotion to the public service. At the whig convention of 1852, although his policy, the fugitive slave law included, was approved by a vote of 227 against 60, and although one of his cabinet, who was known to have approved of all his measures, was nominated for vice-president, he could not command 20 votes from the free states. This was owing, no doubt, partly to his lack of friends among active politicians whom he had never sought to conciliate by hopes of patronage, and partly to the exertions of the friends of other candidates, but chiefly to his unpopularity with that large section of his party whom he had alienated by his signature of the fugitive slave law. His departure from the seat of government was also embittered by a heavy domestic grief. Mrs. Fillmore, whose early advantages had been superior to his own, and who through his rising fortunes had been his nearest friend and counsellor, died at Washington, March 30, and he returned to Buffalo deprived at once of public employment and of the solaces of private life.—Since the close of his administration, Mr. Fillmore has devoted himself to the study of general literature with systematic industry. During the spring and summer of 1854, he made an extensive tour

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through the southern and many of the western states; but the year was rendered one of the saddest of his life, by the death of his only daughter. By this bereavement he was left with an only son, now a practising lawyer in Buffalo. In the spring of 1855, after an excursion through New England, he sailed for Europe, where he remained until June, 1856. He was received with marked distinction by the leading statesmen and at the principal courts of Europe. The degree of D.C.L. was tendered to him by the university of Oxford, but he declined the honor. While at Rome he received the news of his nomination as candidate for the presidency by the American party. He accepted the nomination, but before the close of the campaign it became evident even to his friends that the real struggle was between the democrats and the republicans. Very many of those with whom he was the first choice for president cast their votes either for Mr. Buchanan or Mr. Fremont, believing that there was no hope of Mr. Fillmore's election; and though he received the support of large numbers in all the states, Maryland alone gave him its electoral vote. On Feb. 10, 1858, he was married to Mrs. Caroline McIntosh, the youngest daughter of the late Charles Carmichael of Morristown, N. J. He has since resided in Buffalo, devoting himself to study and to the society of his friends, and enjoying that general respect to which he is justly entitled by his many years of public service, and by his punctilious and faithful performance of all the duties of private life.

FILLMORE CITY, the capital of Utah territory, is the principal settlement in Millard co., and lies about 150 m. almost due S. from the Great Salt lake. Both it and the county were named in honor of Millard Fillmore, who is held in great esteem among the Mormons on account of the favor he displayed toward them at the time of the organization of the territory in 1850. The city charter was granted by the territorial legislature in Feb. 1852. The white population now (1859) is about 700. In the vicinity is one of the government Indian farms, which is the head-quarters of a band of Pahvant or Para-vant Indians, an offshoot of the great Utah nation. The chief, Canosh, is noted as one of the most inveterate thieves that infest the roads across the continent. The main wagon road to California *via* Parowan, Mountain Meadows, Santa Clara, and San Bernardino, passes through Fillmore, and for many years the principal subsistence of Canosh and his band has been derived from depredations upon American travellers. The only building in Fillmore of any pretension is the capitol. The plan of this edifice, of which one wing only has been completed, is in the shape of a Greek cross, with a rotunda in the centre 60 feet in diameter. The material is red sandstone, rough hammered. All the other buildings in the town are of adobe or else of fire-burned brick, which last is made nowhere else within the territory, and rarely here, owing to the scarcity of fuel. The situation of Fillmore is very beautiful, being directly at the foot of the main Wahsatch range, and commanding a view of at least 150 m. westward into the Great Basin. The altitude of the site is more than 5,000 feet above the sea, considerably exceeding that of Salt Lake City. In one respect Fillmore differs noticeably from the chain of towns running northward from it toward the Salt lake; it is open on all sides, whereas most of the others are walled. The difficulty of transit from the northern and most populous portion of the territory in the winter, led the Mormon legislature in 1856 to pass resolves removing the seat of government to Salt Lake City; but it has been conceded that these resolves were unauthorized, and the capital is now definitely established at Fillmore.

FILTER, an instrument for separating from finids the foreign substances mechanically intermixed with them. Beds of sand and gravel constitute natural filters, through which the waters of springs flow upward clear from all sediment and visible impurity. Artificial filters are constructed upon the same principle; a diaphragm of some substance is presented, through the pores of which the fluid can penetrate, but which are so fine that they arrest the particles held in suspension. They are variously constructed according to the nature of the fluid to be purified. The chemist takes a disk of unsized white paper, and doubling it twice, introduces it into a funnel of proper size, which, for facilitating the passage of the fluid, is commonly ribbed, and opening one of the folds, pours in the liquid. This soon drops through the paper and the funnel, leaving the sediment behind; if any of this passes through in the commencement of the operation, it is commonly retained when returned after the pores of the paper are wet and partially obstructed. The sediment is often the object of this process; in this case it may be washed clean of the liquid which contained it by the use of water, or sometimes of some other fluid which has no chemical action upon the residuum. Paper is an excellent material for filters; but those kinds should be selected which contain the least amount of earthy matters, lime particularly, the presence of which may affect the composition of the substances employed. These may, however, be in part dissolved out by acids before using the filter. Each filter is used only once; and thus there is no accumulation of impurities to impair its quality. The weight of the ashes yielded by a disk of the size used being known, the quantity of the insolnble precipitate collected in the filter may be determined by burning both together, thus avoiding risk of loss in removing the fine particles, and of nncertainty as to the proportion due to the filter when the burnt product is weighed. Apothecaries also use paper filters, but generally of coarser material and folded from a sqnare piece in a nnmber of folds like those of a paper fan, all of which terminate in one point which was the centre of the square. Paper filters are

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strengthened and made more impervious when necessary by using one within another. In filtering for the purpose of obtaining extracts, a very efficient apparatus is made use of by the apothecaries, called Boullay's filter, which has been already noticed under EXTRACTS. The old pharmacentists used a cone-shaped bag of cotton or woollen called Hypocrates's sleeve, and the same contrivance is still one of the best for the clarification of sirups and other viscid liquids. Cotton flannel, which has a thick nap, is an excellent material. The conical hat body made of felt is well adapted, before its shape is altered, to the filtration of fixed oils. Corrosive liquids, as strong acids, may be cleared by passing them through pure silicious sand supported upon coarse fragments of glass placed in the neck of a funnel and gradually diminishing in size upward. Sponges have been used for filters from time immemorial for purifying the water of the Niger; unless often replaced, they have the defect common to all filters made of organic materials, as straw, hemp, cotton, sawdust, shavings, branches, leaves, &c., of undergoing a chemical change from constant exposure to dampness, which at last causes them to affect injuriously the quality of the liquid. The fibres of asbestus might be substituted with advantage, and would moreover find a proper application in the filtration of corrosive fluids. Charcoal is a favorite material, particularly for the purification of water used at sea; it has the property not only of separating the impurities passed through layers of it alternating with others of sand, but also of removing disagreeable odors. The Japanese use porous sandstones hollowed into the form of an egg, and set in a frame over a vessel, into which the water drops as it percolates through the stone. The Egyptians adopt the same method for clarifying the water of the Nile. A stone which answers this purpose well has long been known at Teneriffe, and was formerly largely imported into England. In Spain porous earthenware vessels are manufactured, called *alcarrazas*, which are used for this purpose, and also for wine-coolers. (See EVAPORATION.) New devices designed for exhibiting or rendering more efficient the process of filtering are constantly appearing, some of them not differing from methods long ago introduced, yet protected by patent rights. Filtering upward, by introducing the liquid at the bottom of a cask and causing it to rise by the pressure of the column behind through sand and gravel or charcoal, was patented in England in 1791, together with the method of getting rid of the sediment by washing it out with currents of water passed under pressure in the contrary direction. In 1800 a process not essentially different was patented in France, the water being made to pass in a downward direction through layers of such materials, to which sponges were also added. It was employed on a large scale in 1806 to clarify the water of the Seine. After the water passes through the layers contained in leaden boxes, it is made to drop from a height like rain, in order to take up the air found in rain water, and which it has lost in its filtering. When the river water is very turbid, the upper strata require renewal twice a day on account of the impurities deposited. The quantity of water passed through them is proportional to the area of the filtering surface. Each square metre of surface produces in 24 hours about 3,000 litres of pure water, or each square foot about 73½ standard gallons. The result, however, varies with the state of cleanliness in which the filtering materials are kept; and as the degree of retardation cannot be ascertained beforehand, it will be impossible to calculate with accuracy the capacity of any filter of this nature. An ingenious filter was noticed at the London exhibition, sent by the Wenham lake ice company of Massachusetts, the invention of Mr. Alfred Bird. It consists of a siphon, the short limb of which terminates in a cylindrical box, which is placed in a cask of water under the surface. This box contains the filter, and on drawing the air out of the long arm, which projects from the cask, the water is forced up through the filter and passes through the siphon, its flow being regulated by a stop-cock at the lower end of the long arm. It has the advantage, if the cask is kept properly supplied, of drawing the water neither from the top where the lighter sediment collects, nor from the bottom to which the heavier impurities sink. Filters upon a large scale are connected with the reservoirs from which cities receive supplies of water. These reservoirs are divided into several basins, the first of which are intended for receiving the sediment that will subside as the water is left standing; from these it passes through porous beds which separate them from an adjoining basin, and which collect the impurities still remaining suspended. By using several such basins the beds may be kept alternately in use, affording an opportunity for their cleansing whenever this is required.—In connection with the purification of water by filtration, ingenious methods have been devised of separating the soluble salts of lime, &c., which give the property of hardness to water, and which being in the state of solution pass through the filter. Pure water can thus hold only about two grains to the gallon of carbonate of lime, or $\frac{1}{32.555}$; but as the water absorbs carbonic acid gas, its power of dissolving carbonate of lime increases, till its capacity may be 10 times that of pure water. Its hardness increases with the quantity of lime taken up. Thus the water of springs, especially in districts where calcareous rocks abound, differs in composition from the soft rain water which has not flowed through the ground. When such water is boiled, the excess of carbonic acid gas is expelled, and with it the capacity of holding a portion of the carbonate of lime. This falls as a precipitate, and forms the crust which collects on the inside of kettles in which such water is boiled. By continuing the boiling, all the lime may be thus separated, ex-

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cept about two grains to the gallon; and it is then in the best condition to be purified by filtering. Other salts, the solubility of which does not depend upon the carbonic acid gas present, as the sulphate of lime, or the chlorides of soda, magnesia, &c., which give the saltness and hardness to sea water, can only be separated by distillation.—There are also some substances often present in the state of suspension in water which may not be separated by subsidence or filtration. Such are some organic matters, and the fine clayey or aluminous particles. Waters which wash cliffs of clay become saturated with the impalpable material, which they almost wholly refuse to shed by any mechanical action. This property may be witnessed upon a large scale in passing in a steamboat along the north shore of Lake Erie, where the water, particularly after a storm, carries the sediment from the clayey banks miles out into the lake, and receives from it a milky appearance. Such water, it is found, may be purified by adding to it a few grains of alum to the gallon. The alum is decomposed, and its ingredients fall in insoluble precipitates, carrying with them the alumina or other impurities which discolor the water; and all may be separated by filtration or decantation except the excess of alum that may have been added. Its use is objectionable from the liability of adding it in excess, and also from the formation of a sulphate of lime, a portion of which remains in solution, rendering the water hard. Caustic or quick lime is also used for a similar purpose. It acts by seizing upon the free carbonic acid present, and thus all the carbonate of lime in solution, except two grains to the gallon, is rendered insoluble, and falls together with the lime introduced to the bottom. This process has been put in practice upon a large scale at the Mayfield print works in Lancashire, England, in which 300,000 gallons of water are daily purified. Filtration is not necessary unless the water was turbid before the liming, the precipitate formed subsiding in the course of 24 hours, so that the clear water may be drawn off. In the spring of 1851 experiments were made upon the water of the Thames river at the Chelsea water works, from 3,000,000 to 4,000,000 gallons, or nearly a day's supply, being subjected to this process. The quantity of lime admitted was regulated by testing the water in the reservoir by a drop of nitrate of silver, the formation of a brownish precipitate indicating that an excess has been introduced. All the fixed constituents contained in one gallon of water were found to be reduced from 24.07 to 8.31 grains, and the organic matter from 2.50 to 1.60 grains. The water was rendered comparatively soft and transparent, acquiring neither odor nor taste by the process. The cost was estimated at about £1 for 1,000,000 gallons.

FINCH, a name given to many birds of the order *passeres*, tribe *conirostres*, and family *fringillidæ*, including a numerous series of small and generally brilliant birds, with short, thick, more or less conical bill, without emargination at the tip. This family, according to Gray, comprises the sub-families *ploceinæ*, or weavers, African for the most part, except the typical genus *ploceus* (Cuv.), which is Asiatic; *coccothraustinæ*, or hawfinches, well scattered over the globe, of which the rose-breasted grosbeak is a familiar representative in the United States; *tanagrinæ*, or tanagers, peculiar to this continent, especially to South America; *fringillinæ*, or finches, found all over the world; *emberizinæ*, or buntings, of which the common snow bunting is a good example; *alaudinæ*, or larks, of which the shore lark of the north and a second species on the Pacific coast are the only American specimens: this sub-family is by some, and with good reason, removed from the *fringillidæ; pyrrhulinæ*, or bullfinches; *loxinæ*, or crossbills; and *phytotominæ*, or plant-cutters. The characters of the bullfinch, bunting, and crossbill have been given under those titles respectively; those of the grosbeaks, hawfinches, larks, plant-cutters, tanagers, and weavers, will be noticed in their alphabetical order; leaving nothing for this article but the proper finches. The characters of the *fringillinæ* are, in addition to those already alluded to as belonging to the whole family, wings more or less lengthened and pointed; tail varying in length, sometimes with the feathers acuminated; tarsi rather shorter than the middle toe, in a few cases as long, slender and transversely scaled; toes long and slender, the hind toe moderate, with the claws curved and acute. The genus *estrelda* (Swains.) is found in Africa, Asia, and Australia, occurring in small flocks in meadows and bushy grounds, and occasionally visiting gardens. The wax-billed finch, or bengaly (*E. astrild*, Linn.), is of the size of a wren, about 4½ inches long; the bill is deep red, and a streak through the eye and the middle of the breast are of the same color; the general color above is brown, and below reddish gray, everywhere crossed with fine blackish undulations. This handsome bird inhabits Africa from Senegal to the cape of Good Hope; it often commits considerable havoc in gardens, where it devours both buds and seeds; it is frequently kept in cages, more for its beauty than its song. The wings in this genus are short, and the flight is consequently for small distances at a time; the tail is lengthened. There are more than 40 other species. As a specimen of the genus *amadina* (Swains.), differing from the last chiefly in a more uniformly conical bill and in a short and rounded tail, may be mentioned the Java finch, commonly called here Java sparrow (*A. oryzivora*, Linn.); other names are the padda and rice bird. This is of the size of a sparrow, in length about 5 inches; the bill is stout and red; the eyelids are of the same color; the head and throat black; the sides of the head, under the eyes, white; the upper parts pale ash; belly and thighs pale rose, white toward the vent; the tail black. It inhabits Java, China, and India, where it occasionally does

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much mischief in the rice grounds; it eats seeds and insects; it is often seen here as a cage bird, and is a favorite for its beauty. There are more than 50 other species of the genus.—The typical finches are found in the genus *fringilla* (Linn.), which is distributed over all the world, living in flocks in which are often associated several species; their food consists of seeds of various kinds of plants and trees in winter, and of larvæ, grubs, and grain in summer; some, like the red poll and the snow bird, are found in very cold regions. There are more than 80 species, which by Gray were brought under the Linnæan genus *fringilla;* some of the old subdivisions have been re-adopted in Prince Bonaparte's *Conspectus Avium*, and in Baird's catalogue of North American birds, but the simpler method of Gray will be adhered to in this article. In the genus *fringilla* the wings are long and pointed, and the tail is generally slightly forked. The chaffinch (*F. cælebs*, Linn.) has been described under that title, and the siskin (*F. spinus*, Linn.) under ABERDEVINE; the goldfinch (*F. carduelis*, Linn.), the redpoll linnet (*F. linaria*, Linn.), the snow bird (*F. hyemalis*, Linn.), and the yellow bird or American goldfinch (*F. tristis*, Linn.), will be noticed under their respective titles.—The brambling or mountain finch (*F. montifringilla*, Linn.) is a little smaller than the chaffinch, being about 6¼ inches long, with an extent of wings of 10½ inches; it resembles this bird in its form, mode of flight, gait, and manners; the bill is larger in proportion. The greater part of the upper mandible and the end of the lower are dusky, the base of the former pale gray, and the rest of the latter yellow; the head and back in the male are deep black, the feathers with a tinge of rusty gray; the throat, breast, and upper wing coverts are light reddish brown; the rump white tinged with yellow; the quills and larger coverts black, the former margined with yellow externally, the inner with a reddish margin and a white spot at the base; the sides spotted with black; the tail black, the exterior feather white on the outer web, and the middle ones edged and tipped with ash color; abdomen and lower tail coverts yellowish white. The female is much less bright; the sides of the head and the back of the neck are gray, the top of the head and back being dusky margined with gray; the rufous markings of the breast and wings are very faint; the size is smaller. It is seen in Great Britain in large flocks in winter, with the chaffinch and allied species, disappearing toward the end of spring, going north to breed; it is hardy and bold, feeding on seeds and what it can pick up in the open fields; its flight is rapid and undulating; the note is like the "tweet" of the chaffinch repeated several times; according to Montagu, it builds a nest in fir trees, and lays 4 or 5 yellowish spotted eggs. Albinos are occasionally seen. It is said to be very fond of beech mast.—The green finch (*F. chloris*, Linn.), also a European species, is about 6 inches long and 9 in extent of wings; the bill is very stout, the tail short, and the body bulky, which characters have led Mr. Gould to consider it rather a grosbeak (*coccothraustes*) than a finch, and it no doubt is one of the intermediate forms between this and *fringilla*. The male is bright olive green above, passing into yellow; the quills blackish gray, with outer webs bright gamboge yellow; the tail, except the 2 middle feathers, which are gray with light yellow margins, are yellow like the wings, with the external edges grayish brown; below greenish, passing into sulphur yellow; the bill is white, with a pink tinge; the legs brown; the young are marked with oblong dashes of brown on the lower surface and the upper part of the back. This is an indigenous, non-migratory, hardy bird, living in flocks, familiar and docile; it is often kept in confinement for its facility in imitating the notes of other birds; its own song consists of 3 or 4 short mellow notes, which are very pleasing during the breeding season; it is not particular in its choice of food, eating the usual grains and seeds given to caged birds. The eggs are 4 or 5 in number, pale bluish white, speckled at the larger end with reddish brown. —The pine finch (*F. pinus*, Wils.; *chrysomitris*, Boie), distributed over North America from the Atlantic to the Pacific, is 4¾ inches long, with an extent of wings of 8½ inches. The plumage is soft, but with little gloss; the short, conical, acute bill is light yellowish brown, with a dusky tip; the iris brown; general color above yellowish gray, with dark brown streaks; the wings and tail dusky, with grayish white edges; the base of the secondaries, the tips of their coverts, and the margins of the rump feathers are cream-colored; grayish white below, with streaks of dull brown, and a brown tinge on the fore neck; the female very closely resembles the male. This species, though seen in the southern states, prefers the northern regions of the country and the Canadas, wherever pine trees abound; it is most common in the north during winter, where it is seen in small flocks with the redpoll and the crossbill; the favorite food is found amid the branches of the highest fir trees, where they hang head downward like the titmouse; the seeds of the thistle and the sweet gum are also much eaten by them. Though he could find no nests, Audubon met with great numbers of these birds accompanied by their young on the coast of Labrador toward the end of July; and they doubtless breed there. The mode of flight and notes resemble those of the goldfinch; like the latter, it sweeps through the air in long graceful curves, uttering its sweet and clear song as it takes a fresh start.—The genus *passer* (Briss.) includes the sparrows of the old world, which are rarely called finches. The American sparrows are contained in the genus *zonotrichia* (Swains.); many of these are popularly called finches; the bill is perfectly conical, the wings moderate, the tail long, broad, and nearly even at the end. The grass finch (*Z. graminea*, Gmel.; genus *poöcætes*, Baird) is 5¾ inches long, with an extent of wing

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of 10 inches; the general color above is light brown, streaked and mottled with darker; a narrow circle of white around the eye; throat and breast yellowish white, the latter streaked with dark brown; the larger coverts and the quills deep brown, the former edged with paler, and the first of the latter with white external margin; lesser coverts bay; tail deep brown, marked and margined with white; sides and abdomen pale yellowish brown, the former streaked with darker; under tail coverts white. It is distributed far to the north and over the United States from the Atlantic to the Pacific, and there is a variety, or perhaps a species, to the west of the Alleghanies; it seems to prefer sandy and barren soils in cultivated districts, its song is sweet and protracted; it is shy and solitary, and runs nimbly through the grass, in which the nest is built; the eggs, 4 to 6 in number, are laid about the middle of April at the south, where 2 broods are generally raised each year; they are ¾ of an inch long, bluish white, with reddish brown blotches; the food consists of various kinds of seeds and insects, and the flesh is tender and of good flavor. This bird employs a great variety of artifices to deceive any one who approaches her nest, imitating lameness, and attempting to draw attention to another locality. Lincoln's finch (*Z. Lincolnii*, Aud.; *melospiza*, Baird) is yellowish brown above, with streaks of brownish black; head chestnut, streaked with brownish black, with a grayish blue band in the centre and two at the sides; quills and larger coverts deep brown, with lighter margins, and the latter tipped with whitish; tail yellowish brown; throat white, with dusky streaks and spots; below grayish white. It is found as far north as Labrador, from the Atlantic to the Pacific, and south through Mexico to Guatemala. The song is very sweet and loud; the flight is rapid and low; the food is insects and berries; the males, as in most finches, are pugnacious.—The genus *ammodromus* (Swains.) has the wings short, the tail lengthened, the lateral feathers graduated, with the end of each acuminated; the species generally remain within the limits of tide water, and run along the shores among the weeds, like sandpipers, climb along the rushes, or swiftly dart among the tufts of grass; they eat shrimps, small mollusks and crustaceans, and other minute marine animals. The sharp-tailed finch (*A. caudacutus*, Gmel.) is found along the whole Atlantic coast of the United States, being most abundant among the salt marshes of South Carolina. The crown of the head is bluish gray in the middle and deep brown at the sides, with a band of yellowish red from the bill over the eye; hind neck dull gray, tinged with brown; fore neck pale yellowish red with dusky streaks, the throat paler and unspotted; back brown, tinged with gray; primaries and tail wood brown; secondaries and smaller coverts reddish brown; sides yellowish red, with dusky streaks; breast and abdomen grayish white. They come down to the marshes when the tide is out, returning to the shores and rice fields at high tide; the note is a single "tweet;" the nest is placed on the ground, near the water, in a slight hollow; the eggs, 4 to 6, are laid sometimes twice in a season; the color is dull white, with light brown dots, most numerous at the larger end; from the quickness with which they move on the ground, they are most easily shot on the wing. The seaside finch (*A. maritimus*, Wils.), with similar habits to the preceding, and found in the same localities as far north as Long island, has the crown of the head deep brown, surrounded by a line of grayish blue; upper part of the back, wings, and tail, olive brown mixed with pale blue; lesser wing coverts reddish brown; a yellow streak from the bill over the eye; throat and fore neck grayish white; breast and sides grayish blue, the abdomen paler. The eggs are grayish white, with brown freckles all over; many nests are found in company. The food consists of marine insects, snails, crabs, sand beetles, and seeds.—Bachman's finch, placed in the genus *ammodromus* by Gray, belongs to the genus *peucæa* (Aud.); this (*P. æstivalis*, Licht.) is reddish brown above, with the centre of the feathers black and their margins bluish gray; the quills dark brown, with lighter edges; tail feathers brown, lighter on the outer edges; ochre-yellow streak over the eye; throat pale yellowish gray; fore part of the breast and sides tinged with brown, lower parts yellowish gray. The length of the bird is 6 inches, and the extent of the short wings only 8. The habits of this species render it difficult to observe; it runs in the grass more like a mouse than a bird, and is much oftener heard than seen; the notes are soft and sweet, justifying the remark that it is perhaps the finest songster of the sparrow family. The food consists of grass seeds, beetles, and berries. It is confined to the southern states.—In the genus *spiza* (Bonap.), or *cyanospiza* (Baird), the wings and tail are moderate, and the latter even. The painted finch (*S. ciris*, Linn.) is 5¼ inches long and 7¼ in extent of wings; in the adult male, the head and neck are azure blue; the back and lesser wing coverts yellowish green; circle round the eye, lower back, and under parts carmine; quills and tail purplish brown; secondary coverts green. The female has a brown bill, the upper parts light olive-green, and the under parts dull orange, paler behind; the male of the first year resembles the female, except in having the blue lower mandible of his sex; the adult male plumage is not obtained until the 4th year. It is an inhabitant of the south Atlantic and gulf states, extending into Texas and Mexico; its flight is short and quick, and its movements on the ground like those of the sparrows; its song is very sonorous and pleasing, and is continued through the hottest part of the day; the nest is usually built in an orange tree, and the eggs, 4 or 5, are of a fine bluish pearl color, speckled with blackish. It appears in the vicinity of New Orleans about the middle of April, when great numbers are taken in traps, set with a stuffed

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specimen of a male bird; all males which perceive this are led by their pugnacious dispositions to attack it, and the trap springs upon them during the operation; they are easily kept in confinement, and will sing and breed in captivity if properly cared for. Great numbers of this beautiful finch were formerly carried to Europe, where they brought almost fabulous prices, a bird which cost 8 cents in New Orleans selling in London or Paris for more than twice as many dollars. Their flocks sometimes occasion considerable damage to ripe figs and grapes, of which they are exceedingly fond. The lazuli finch (*S. amœna*, Say) is another handsome and allied species, belonging rather to the Pacific fauna. The bill is brownish black; the head and neck, hind part of back and rump, are beautiful greenish blue; fore part of the back, scapulars, wings, and tail, brownish black, the feathers with blue margins; a conspicuous white band on the wings; on the fore part of the breast a broad band of brownish red; the sides, lower wing coverts, and tibial feathers, bluish gray; lower parts white. The female is far less brilliant, a grayish tint prevailing in most parts of the plumage. It is rather a shy bird, with a lively and pleasing song. Another beautiful species is the *S. cyanea* (Linn.), which will be noticed under INDIGO BIRD.—The last finch which will be mentioned belongs to the sub-family of *pyrrhulinæ*, and to the genus *carpadacus* (Kaup.). The purple finch (*C. purpureus*, Gmel.) is 6 inches long, with an extent of wings of 9 inches; The bill is very robust, conical, bulging, and acute, deep brown above, bluish below; the head, neck, breast, back, and upper tail coverts are of a rich lake color, nearly crimson on the head and neck, and fading into rose color on the abdomen; the fore part of the back is streaked with brown; the quills, larger coverts, and tail are deep brown margined with red; a narrow cream-colored band across the forehead close to the bill. The female and young are brownish olive above, with dark brown streaks; the under parts grayish white, the sides streaked with brown; quills and tail feathers dark brown with olive margins; a broad white line over the eye, and another from the gape backward. In the southern states their flocks are seen from November to April, feeding on the interior of buds which they husk with great skill; they are usually seen in the morning and at night, darting after insects. Their song is sweet and continued. They are found from Labrador to Louisiana, being replaced on the Pacific coast by the *C. Californicus* (Baird) and the *C. Cassinii* (Baird); they breed in the north, where they are seen in midwinter in company with crossbills and other hardy birds, feeding on the berries of the evergreens. Their nests have been found in Massachusetts; the eggs are of an emerald green color, with a few black dots and streaks near the point, and some purplish blotches. The farmers believe them to be injurious to fruit trees by destroying the blossoms, great numbers of which they pull off. Audubon considers their flesh equal to that of any small bird, except the rice bunting. They are sometimes kept in cages and in aviaries, but they do not sing in confinement.—Many other sparrows and buntings are called finches in different parts of the country, but they all belong to the family of *fringillidæ*, and may be found described in any work on ornithology.

FINCH, HENEAGE, 1st earl of Nottingham, a British statesman and jurist, born in Kent in Dec. 1621, died in Dec. 1682. He was educated at Westminster school and at Christchurch college, Oxford, subsequently studied law in the Inner Temple, and rose to great eminence as a lawyer. During the revolution he enjoyed general respect and confidence. At the restoration he was made solicitor-general, took part in the prosecution of the regicides, of which he wrote a full account, and in 1661 entered parliament as member for the university of Oxford. In 1667 he defended Lord Clarendon, when impeached for high crimes and misdemeanors, and after being successively attorney general and lord keeper, was appointed in 1675 lord high chancellor of England. In 1681 he was created earl of Nottingham, having for some years previous borne the title of Baron Finch of Daventry. He was equally celebrated for his eloquence in the senate and at the bar. His literary remains include a number of published parliamentary speeches and legal arguments, and some volumes of manuscript chancery reports.

FINDEN, WILLIAM, an English line engraver, born in London in 1787, died there, Sept. 20, 1852. He was apprenticed to an engraver, and afterward found employment as an engraver of book plates. Being remarkable for a certain neatness of line and smoothness of finish, he became one of the most popular engravers of his time, and was selected to engrave Lawrence's celebrated portrait of George IV., for which he received 2,000 guineas. He also engraved the "Village Festival" and the "Highlander's Return," both from well known pictures by Wilkie. He published some very extensive series of engravings, the best of which is the "Gallery of British Art;" he lost heavily by this enterprise.

FINDING. It is a little strange that when the act of finding is so common, and always must have been so, the law of finding is, in some particulars, not quite settled. It is certain that nothing can be found that was not lost; hence, unless the owner of property has it no longer in his possession or within his reach, and is deprived of all power over it, either by accident or voluntarily, as when he casts it away, another man who happens upon it acquires none of the rights of a finder. Lost goods were defined by the old law as *bona vacantia*; and Savigny, in his "Treatise of Possession" (of which there is an excellent translation into English, by Sir Edward Perry), says, § 18: *Vacua est, quam nemo detinet.* The ancient law of treasure trove was said to apply to gold and silver only; and indeed only to that which had been purposely

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hidden in the earth, and of which the owner was unknown. Originally it belonged to the finder; but many centuries ago it was adjudged to belong, to a greater or less extent, to the sovereign, and Grotius says this rule had become in his time *jus commune, quasi gentium*. Blackstone ("Commentaries," vol. i. p. 296) makes a distinction between goods hidden by the owner, which the owner never reclaimed, being prevented by death, forgetting, or neglect, and goods voluntarily or accidentally cast abroad. In the first case, there was no intention to abandon them, and when they were not the owner's they became the king's, to whom the finder must give them. In the latter case they became the property of the finder. The law of treasure trove never had much force in this country; and although there were formerly some colonial regulations and are now some statutory provisions in respect to finding, they do not appear to have much force, unless it be in relation to what may be termed wrecks. The law on this subject, so far as it can be gathered from the authorities, seems to be this: 1. The finder of lost property is owner of it against all the world excepting the original owner; but the owner may reclaim it from the finder at any time, although leaving it unclaimed in the finder's hands for a sufficient length of time after the owner knew where it was and could claim it (perhaps 20 years, the ordinary period of prescription, might be necessary), would be equivalent to a waiver or abandonment of his ownership. The finder has therefore all the rights of action of an owner, either to recover possession of it, or damages for loss of it or injury to it. 2. The finder is always at liberty to leave what he finds untouched, and cannot be made accountable for any injury thereafter happening to it. But if he takes it into his possession, he acquires some rights and comes under some obligations which do not seem to be perfectly well defined. On the one hand, it is said by the old authorities, that if the thing found perish by his mere neglect, or without his active aid, he is not responsible. But the tendency of modern law is, that while he may abstain if he pleases from any interference whatever, if he chooses to take what he finds into his custody, he makes himself responsible not only for any wilful injury to it (which is quite certain), but for the consequences of his gross negligence. 3. As the correlative rule, or as the right which corresponds to this obligation, he may demand from the owner all his expenses necessarily incurred in keeping and preserving the property, and probably his reasonable expense in the way of advertising, or for similar charges for the benefit of the owner. We should say that where a finder takes into his possession the thing found, it becomes a kind of bailment; and the owner, by reclaiming and receiving it from the finder, assents as it were to this bailment; and out of this constructive bailment grow the obligation and responsibility of the finder on the one hand, and his rights on the other. 4. It has been intimated by one high authority, at least, Judge Story ("Bailment," sections 35 *et seq.*), that the finder may also make a further charge against the owner for compensation for care and labor, and perhaps for reward. There are moral reasons for this, but no legal authority; and except when property is found at sea, and comes under the admiralty law of salvage, we know no law which authorizes the finder to claim more than his expenses. 5. For whatever the finder may lawfully demand of the owner in respect to the property found, he has, we think, as one of the consequences of the constructive bailment above spoken of, a lien on the property itself; that is, a right to hold it even against the owner, until his demand is satisfied. 6. It seems now to be settled that the place where property is found has no effect upon the rights of the finder. Thus if A finds money on the floor of B's store, and hands it to B for the owner, and B advertises, and does what else he should to discover the owner, and fails in this, the finder may demand it of B, tendering B's expenses in discharge of his lien. There was at one time some disposition to say that if A found goods buried in B's lands, they were the property of B; but this seems to have passed away, or rather never to have been settled law, and the rule above stated, that the place where found has no effect whatever on the right of the finder, is without qualification. 7. If a reward be offered, which is specific and certain, or can be made so by reference to a certain standard, the finder by bringing the thing found to the owner, or otherwise complying with the terms of the advertisement, becomes a party to a contract offered to all by the advertiser, and may sue for the compensation or reward promised. But if the advertisement is general only, as that the finder shall be liberally rewarded, the finder has no specific claim, and can have no action. 8. The rule that the finder is owner against all the world except the original owner has one important exception. A finder of what the law calls a *chose in action*, or mere evidence of debt or claim, cannot demand payment of it; and if one should pay a note, a check, or a lottery ticket, to a holder known by the payer to have come into possession of it by finding, the payer would be bound to pay the amount to the owner who could prove his property. 9. A finder may incur punishment as for crime, by misconduct about the property he finds. Thus, if he knows the owner, or there are circumstances which, if he chose to profit by them, would lead him to the owner, a conversion of the property to his own use is larceny or theft. But it is not larceny unless the *animus furandi* existed at the time of the appropriation; for if the finder only discovered the owner after he had made the appropriation, and then concealed his finding, it would seem to be the law that he is answerable only in damages.

FINISTÈRE, or FINISTERRE, the extreme W. department of France, from which position (Lat. *finis terræ*, land's end) it derives its name, sur-

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rounded on 3 sides by the ocean and the English channel, and bounded E. by the departments of Côtes-du-Nord and Morbihan; length N. and S. 65 m.; breadth about 55 m.; area, 3,575 sq. m.; pop. in 1856, 617,710. It was included in the former French province of Brittany. The coasts, generally steep and deeply indented, are about 410 m. in length, and present many excellent bays and harbors. The most important ports are Brest, Morlaix, Landerneau, Quimper, and Douarnenez. Of numerous rivers, 3 only, the Aulne, the Elorn, and the Odet, are navigable. Two hill chains, that of Arés in the N., and that of the Black mountains in the S., run through this department E. and W. The climate is mild, but humid; fogs are common; W. winds are most prevalent, and violent storms often occur. The soil of some parts is good, and the pastrage is excellent; but heath or waste land covers no less than a third of the department, and agriculture is in a backward state. The wealth of the department consists especially in its argentiferous mines of lead; those of Poullaouen and Huelgoat are perhaps the largest in France. Iron, zinc, coal, and bitumen are also mined. The fisheries employ about 880 boats and 4,400 hands, and realize a gross produce of about $500,000 a year. There are manufactures of linen and woollen fabrics, paper mills, rope yards, sailcloth, and earthenware factories.

FINLAND (Fin. *Suomema*, region of lakes), a grand duchy in the N. W. of the Russian empire, lying between lat. 60° 50′ and 70° N., and long. 32° and 21° E., bounded N. by the Norwegian province of Finmark, E. by the Russian provinces of Archangel and Olonetz, S. by the gulf of Finland, and W. by the gulf of Bothnia and Sweden; area, about 136,000 sq. m. The name of Finland was given to it by the Swedes. The population in 1856 was as follows:

Nyland	154,913
Abo	298,278
Tavastehus	155,685
Viborg	263,343
St. Michael	153,621
Kuopio	212,131
Vasa	271,845
Uleaborg	171,522
Total	1,688,488

The population comprises 125,000 Swedish Finns, 8,000 Russians, 1,000 Lapps, 1,000 gypsies, 400 Germans, and the rest are Finns proper. The most populous districts are along the coast; there are some districts in the interior wholly uninhabited. The population of the whole country is about 12 to the square mile.—The S. coast of Finland is bordered with rocky islets, between which and the mainland are narrow and intricate channels difficult of navigation. The W. coast is generally low, but becomes very rocky near the Quarken, and in some parts is not less dangerous than the southern. Some of the islands, as those of Sweaborg, which command the entrance to the harbor of Helsingfors, are strongly fortified. The rivers are few and unimportant; the principal is the Kymmene, which flows into the gulf of Finland, and is broad and deep, but owing to cataracts is not navigable. The lakes, however, constitute a prominent feature in the geography of the country, being very numerous and occupying a large proportion of the territory. Independently of Lake Ladoga, which lies partly in Finland, the largest of these sheets of water are Lakes Saima and Enara. The communication between the various watersheds and the Finnish gulf has been established since 1854 by the lake of Saima. The surface is tableland from 400 to 600 feet above the level of the sea, with occasional higher elevations. The Maanselke mountains in the N. have an average altitude of 3,000 or 4,000 feet. The principal geological formation is red granite with hard limestone and slate. The granite is of a kind which readily disintegrates. The soil is poor and stony, but during a long period it furnished considerably more grain than was required for home consumption. The climate is more severe than that of Sweden, although resembling it in many other respects. Dense fogs are frequent, and the rains in autumn are very heavy. In the S. provinces the winter lasts 7 months. In the N. the sun disappears in December, and is not seen again until the middle of January, but during the short summer it is almost continually above the horizon. The mineral products comprise bog iron, lead, sulphur, arsenic, and a little copper ore. Salt is very scarce, and is one of the principal articles of importation. Among the fauna are the bear, wolf, elk, deer, beaver, polecat, and various kinds of game. Large herds of reindeer are domesticated in the N., and cattle-breeding is a prominent branch of industry. The seal and herring are caught off the coasts, and the lakes and streams abound in salmon and a small species of herring which form an important part of the food of the inhabitants. When connected with Sweden, Finland was called the granary of Sweden; but since the Russian conquest agricultural production is said to have declined. The chief crops are barley, rye, hops, hemp, flax, oats, leguminous plants, and potatoes. A little tobacco, carrots, colewort, parsnips, and onions, are also grown. Wild berries are almost the only fruit. The forests are extensive, reaching N. to lat. 69°, consisting principally of pine and fir, but containing also beech, elm, oak, poplar, ash, and birch. These forests are one of the chief sources of national wealth, but have been much wasted by a system of manuring land with their ashes. The soil requires frequent stimulus, and when the cleared land ceases to produce sufficiently it is abandoned for other portions of soil, the timber of which is purposely burned. Much tar, pitch, and potash, however, as well as firewood, are still exported. The pasture lands are good, but ill managed. About 50,000,000 lbs. of butter are made annually.—Manufactures are chiefly domestic. The peasant prepares his own tar, potash, and charcoal, builds his own boat, makes his own chairs and tables, and in his cottage are woven the coarse woollen and other fabrics of which his dress is

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composed. But there are several cotton manufactories, one of which employs 1,000 workmen. They have the privilege of exporting their productions to Russia, and have hitherto imported their raw material from England; but within the last few years the attention of the manufacturers has been drawn to a direct importation of cotton from America. There were in 1855 in Finland 3 manufactories of steam engines, 20 of tobacco, 8 of cloth, 7 of porcelain, 9 of paper, 5 of leather and tan, and various others. The chief exports are timber, potash, rosin, tar, pitch, firewood, cattle, sheep, hogs, butter, cheese, tallow, skins, herrings, salmon, furs, game, &c. The principal imports are tobacco, sugar, coffee, tea, cotton, salt, copper and other metals, stock fish, wine, arrack, rum, fruits, spices, silks, linen, and stuffs, glass, porcelain, drugs, &c. The following tables exhibit the state of Finnish commerce and navigation in 1852.

COMMERCE.

Countries.	Silver rubles.	
	Exports.	Imports.
Russia	566,282	2,144,843
Sweden and Norway	307,289	562,588
Denmark	229,257	63,650
Germany	270,668	2,251,973
Netherlands	70,995	188,665
England	765,081	629,775
France	179,927	112,465
Spain	171,941	298,125
Portugal	10,425	58,323
Italy	23,630	16,855
Brazil	3,862	328,302
East Indies	...	40,479
Russian America	64,542	....
Total	2,668,819	6,705,572

NAVIGATION.

Vessels.	Arrived.		Cleared.	
	Number.	Tonnage.	Number.	Tonnage.
Finnish	1,198	155,042	1,074	149,736
Foreign	311	56,208	308	53,944
Total	1,509	211,250	1,382	203,680

The commercial fleet in 1855 consisted of about 500 vessels, of which the greater part were employed in the trade with Sweden, Russia, and Germany. Many are employed in the Mediterranean, about 12 in Brazil, and a few in the East Indies. Travelling is effected mostly by posting in carriages without springs. The principal road follows the coast from Abo to Viborg, and thence runs to St. Petersburg, but there are public conveyances only on a part of it. Steamers ply between St. Petersburg and Stockholm and the principal coast towns.—Of the whole population 1,651,353 are Lutherans, divided into 3 dioceses, which control 38 provostships, 487 Lutheran churches, and 223 schools. The archbishop resides at Abo. The rest are mostly of the Greek church, and acknowledge the archimandrite of St. Petersburg. Education receives considerable care, and the study of the Finnish tongue, which was much neglected while the country was subject to Sweden, has been encouraged under the Russian government. Other branches of education have received equal attention from the czar. Beside the Alexander university, transferred from Abo to Helsingfors, there are 3 gymnasiums and 13 superior elementary schools, beside a military academy with 21 teachers and 140 pupils; and most of the parishes have primary schools.—The Finnish language, (Finnish, *Suomen Kieli*) is one of the chief branches of the Uralo-Altaic family; being, with the Esthonic and Lappic collaterals, kindred to the languages of the Ugrians or eastern Turks, Osmanli Turks, Samoyeds and other Tartars, Magyars, Mongols, and Tunguses, whose chief branch are the Mantchoos. All these constitute the so-called Scythic, or Turanian, or Allophylic family. The Kieli, which is spoken by more than 2,000,000 people, consists of many dialects, of which the principal are the lower, used along the coasts (except the islands and towns, where Swedes have settled) of Tavastia, as far as Hemola and Jämsä, of Sacudia as far as Ruovesi, and of Ostro-Bothnia, to the highland of Maanselka, its Abo variety being the dialect used in books; the upper, or that of the inland region, divided into the sub-dialects of Ulea and Viborg, and the varieties of Savolax, Karelia, Annulaiset (Olonetz), Cajaneburg, Ingria, &c. The Suomic language is written with 23 Latin or German letters, of which two are repeated at the end of the alphabet with a diacritic sign, viz., *ä*, *ö*. It contains, however, but 19 genuine sounds, viz., 8 vowels and 11 consonants. The letters *b*, *c*, *d*, *f*, *g* occur only in a few foreign words and in some dialects, and *q* is now obsolete. *K*, *p*, *h* are the most frequent initials, *k*, *p*, *t* the most frequent letters on the whole, and sound a little softer than in other languages. The concurrence of consonants is avoided, so that the foreign words *Francis*, *Stephen*, *school*, *stable*, become *Rantsi*, *Tehean*, *koulu*, *tallis*. There are many diphthongs. Long vowels are written double. The hiatus is not avoided. A few themes end in consonants, but none in *m*. The rhythm of the language is trochaic, and the root bears the tone. Rask considers the Suomic to be the most harmonious of tongues. The radical, which precedes all other syllables, never undergoes any change in its beginning and middle. The theme is originally dissyllabic, and often corresponds to monosyllabic Magyar roots; thus: *käsi*, Magyar *kéz*, hand; *sata*, *száz*, 100; *vesi*, *víz*, water; *veri*, *vér*, blood; *sana*, *szó*, word; *tysi*, *tő*, stem, &c. The various relations of nouns to one another, which in other languages are expressed both by cases and prepositions, are indicated by postpositions or suffixes, forming from the nominative, which is sometimes the theme with a changed final, 13 cases, of which 7 are simple, the others more full. The object is indicated by the genitive, nominative, or partitive, according to the shade of meaning. Plurality is denoted for the nominative by suffixing *t*, and for the other cases by inserting *i* before their endings. In some instances a euphonic *e* is inserted before the endings. Vocal harmony is strictly observed between the vowels of the theme (in

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nouns as well as verbs), and for this purpose the vowels are distinguished into 3 groups, viz.: *a, o, u; e, i;* and *ä, ö, y;* the first and last never occurring in one word together, but both being compatible with the middle one. Hence the first and last group are then converted reciprocally in the suffixes, in order to suit the vowels of the theme; for instance, *maa-ta*, land-part, but *pää-tä*, head-part. No language of this family has grammatic genders, but all indicate sexes either by distinct words or by epithets. The Magyar alone uses an article. The adjectives in Suomic are immutable, and are rendered comparative by suffixing *mpa, mma*, and superlative by inserting *i* before that termination. Nouns and adverbs receive an intenser meaning by inserting *mpa* and *impa*. The numerals are: 1, *yksi;* 2, *kaksi;* 3, *kolme;* 4, *neljä;* 5, *viisi;* 6, *kuusi;* 7, *seitemän;* 8, *kahdeksan;* 9, *yhdeksän;* 10, *kymmenen;* 11, *yksi-toista-kymmentä;* 20, *kaksi-kymmentä;* 30, *kolmi-kymmentä;* 100, *sata;* 1,000, *tuhanen, tuhat*. The personal pronouns are: *minä*, I; *sinä*, thou; *hän*, he, she; *me*, we; *te*, you; *he, hevät*, they. The verbs have but two simple tenses, viz., the present and past, the others being periphrastic. Their conjugation is more complicated than in any other family of languages, expressing by certain syllables inserted between the theme and the personal suffixes all voices, modes, species, and other nice shades of meaning. The infinitive shares more than in any other language in the nature of a noun; it comprehends the Latin gerunds, supines, and other shades of sense, and is declinable. The Finnish language has no separable particles, and even affirmation is expressed by means of the auxiliary *olen*, I am, and negation by means of the verb *e*. By connecting several such significant syllables into one word, the most complicated ideas may be very precisely expressed, which often require many separate words in other languages. Derived words may be formed almost indefinitely. The construction is extremely free, as in Magyar, without endangering the clearness of the sense, as for instance:

Kätso kylväjä meni kylvämään, ja kylväidänsä
Lo! sower went sow-to, and sowing-while
kankesivat muutamat tien oheen, ja linnut
fell some (seeds) road's edge-on, and birds
tulivat, ja söivät ne.
came and picked-up them.

The best grammar of the language is that of Jac. Juden in Swedish (Viborg), 1818. Finnish dictionaries have been published in Latin and Swedish by D. Justenius in 1745, Renvall in Latin, Swedish, and German (Abo, 1826), C. Helenius in Swedish (Abo, 1838), and E. Lönnrot (Helsingfors, 1853).—The national songs or runes of the Finns may be divided into mythological and lyrical songs. They are sung by *Runolainen* (song men), to the sound of the favorite national instrument, the *kantele*, a species of harp with 5 wire strings. The songs, scattered among the people for generations past, and some of which had been published since the beginning of this century, were at length collected by Elias Lönnrot and published at Helsingfors in 1835 under the title of *Kalevala*, which work is now regarded as the great national epic of Finland. Alexander von Humboldt, in his "Cosmos," says: "Among the Finnish tribes who have settled far to the west in the lowlands of Europe, Elias Lönnrot has collected from the lips of the Karelians and the country people of Olonetz a large number of Finnish songs, in which there breathes, according to the expression of Jacob Grimm (*Ueber ein finnisches Epos*, 1845), 'an animated love of nature rarely to be met with in any poetry but that of India. An ancient epos containing nearly 3,000 verses treats of a fight between the Finns and the Lapps, and the fate of a demi-god named Vaino. It gives an interesting account of Finnish country life, especially in that portion of the work where Ilmarine, the wife of the smith, sends her flocks into the woods and offers up prayers for their safety.'" So great was its success that the Finnish literary society took immediate measures for a more comprehensive collection, and the 2d edition, which appeared in 1849, contains 50 songs, with about 23,000 verses, while the first edition contained only about half as many. A Swedish translation of the poem by Castren (Helsingfors, 1844) was speedily followed by a French translation by Léouzon le Duc (Paris, 2 vols. 8vo., 1845), and by a German translation by A. Schiefner (Helsingfors, 1852). Lönnrot has further collected about 600 ancient lyrical songs and 60 ballads (*Kanteletar*, Helsingfors, 1840); about 7,000 proverbs (*Suomen kansan sanalsukuja*, 1842); and about 2,200 charades (*Suomen kansan arvoituksia*, 2d ed., 1851); while Rudbäk has edited a collection of legends and tales (*Suomen kansan satuja*, Helsingfors, 1854). There are many poets in Finland of Swedish descent, and Swedish works are often translated into Finnish. The most popular contemporary Finnish poet is a peasant named Paul Korhonen. An edition of his songs was published at Helsingfors in 1848, under the auspices of Lönnrot. The prose literature of Finland is devoted almost exclusively to religious and moral subjects. A Finnish translation of the New Testament by Michael Agricola appeared in 1548, a portion of the Old Testament in 1552; but the whole Bible was not translated into Finnish until 1642. A *Bibliographia hodierna Fenia* appeared at Abo in 1846, and a continuation in 1849. A catalogue of the Finnish works printed in Finland was published at Helsingfors in 1854. The total number of all sorts of publications issued in Finland between 1843 and 1855 was 4,000. The Finnish literary society has published since 1841 an annual record (*Suomi*). The number of newspapers and periodicals in 1858 was 18, of which 8 were in Finnish and 10 in Swedish. The latter appear at Helsingfors, Viborg, Abo, Borgo, and Vasa.—Finland has been united since 1809 to the empire of Russia. Its constitution was confirmed by the emperor Alexander I., March 27,

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1809; again by the emperor Nicholas, Dec. 24, 1825; and by Alexander II., March 4, 1855. The government is administered by a governor-general and a senate consisting of 14 members, half of whom are noble, and who are presided over by the governor-general assisted by two vice-presidents not included in the number of the members. The senators are named for 3 years by the emperor. The vice-presidents are chiefs of the departments of justice and finance. The deliberations of the senate are held at Helsingfors, the modern capital. High courts of justice sit at Abo, Vasa, and Viborg. There is also a regular military court. Provincial governors reside at Helsingfors, Abo, Tavastehuus, Viborg, St. Michael, Kuopio, Vasa, and Uleaborg. These dignitaries are all, by the terms of the constitution, Finns, and a secretary of state for Finnish affairs, a Finn, resides at St. Petersburg, and is a member of the imperial council. A diet, composed like that of Sweden of the 4 orders, nobility, clergy, burghers, and peasants, is a constitutional privilege of Finland, according to the imperial recognition; but it is now rarely convoked, and is unlikely to be except when its concurrence is necessary to the imposition of new taxes. The army, under the immediate command of the governor-general, comprises an effective force of 6,100 men of all arms. It is the privilege of the Finnish regiments that they shall not be incorporated or intermingled with the forces of the empire. The naval force also forms a distinct squadron under their own national flag. The revenue and expenditures in 1857 were as follows:

REVENUE.	Silver rubles.
Real estate tax	989,080
Poll tax	299,409
Tax on manufactures	43,000
Customs revenue, stamps, &c.	1,284,540
Casual dues, escheats and other	87,195
Total	2,703,215
EXPENDITURES.	
Government	187,728
Department of justice	87,699
Military affairs (army and navy)	741,484
Civil affairs	580,781
Church and public instruction	273,445
Extraordinary expenditures	244,674
Endowments (charitable) and hospitals	180,184
Agriculture and commerce	137, 53
Pensions	131,204
Total	2,549,809

The clergy, part of the troops, and various civil functionaries receive their emoluments and pay from resources not included in the foregoing list of revenue; namely, from country parishes, or from government lands reserved for this purpose. These expenditures therefore do not appear on the general budget. The debt of the state in 1854 amounted to 2,898,200 silver rubles, of which sum 1,850,000 grew out of the war of 1854–'5. A loan of 5,000,000 silver rubles was raised by Finland in 1859 with the sanction of the Russian government.—Less is known of early Finnish history than of that of any other European country. The inhabitants, pagans, were governed by their own independent kings until about the middle of the 12th century. Their piracies at this period so much harassed the Swedes, that St. Eric, king of the latter people, undertook a crusade against them, and introduced Christianity, and also probably planted Swedish colonists upon their coasts. The Swedes thus acquired a hold upon the country which they retained for several centuries. From this period down to 1809 the history of Finland is included in that of the kings of Sweden, during which the country was the frequent scene of Russian and Swedish wars. By the peace of Nystad (1721), 3 years after the death of Charles XII., the territory of Viborg, the eastern division of Finland, became definitively Russian. In 1742 the Swedes, hoping to repair their losses, declared war, and in a few months the whole of Finland was overrun by the Russians. In the following year, at Abo, Sweden ratified anew all her former cessions, yielding additional territory also, but recovered the principal duchy. In 1787 Gustavus III. began his great attempt to recover these losses and to humble his antagonist; but the results of the war added little glory to the Swedish arms. In 1808 a fresh invasion from Russia took place, and Sweden purchased peace by the cession of all Finland and the islands of Aland, Sept. 17, 1809. The Swedish language and customs during 750 years had taken such firm root that Russian dominion has been unable to modify them. Abo remains in some degree a Swedish city, and the removal of the seat of government to its rival Helsingfors (1812), and of the university (1826), has not contributed to Russianize the ancient capital. Indeed, at the present day Stockholm is for Abo much what St. Petersburg is for Helsingfors. Finland suffered greatly during the war of 1854–'5 from the blockade of the allied fleets, but the people manifested a patient fidelity to the cause of her present government. The emperor's exertions to relieve the privations which his Finnish subjects were called upon to undergo are believed to have attached them strongly to him. The bombardment of the Finnish fortresses and the unremitting coast blockade during two seasons conduced in like manner to detach the Finnish sentiment from the western powers, while the maintenance of Swedish neutrality during the war tended also in some degree to alienate the Finns from their ancient masters.

FINLAND, GULF OF, the eastern arm of the Baltic sea, extending from the Aland and Dago islands eastwardly to the bay of Cronstadt and St. Petersburg, between long. 22° and 30° E., and intersected partly by the 59th parallel of north latitude. Its coasts are entirely Russian possessions; namely, Finland and Viborg on the north, and Esthonia on the south. The head of the gulf terminates in the bay of Cronstadt, on the shores of which is the province or government of St. Petersburg. The waters of the great lakes Onega and Ladoga, N. E. of St. Petersburg, flow into the gulf of Finland, the first by the river Svir into Lake Ladoga, and the

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latter by the Neva into the bay of Cronstadt. The bed of the gulf is of calcareous rock, in some parts compact and naked, in others covered and filled with shells. Occasional points of granite are intermingled with this general character. The depth of water is nowhere great, and is least along the southern coast, of which the submerged descent is gradual. The northern shore is much hemmed in with islands. The water is very slightly salt, and is readily drunk by cattle. The harbors of the gulf of Finland are closed by ice every year from early in December to the middle or end of April. It has several times happened that the waters of the gulf, driven by westerly gales, have recoiled so violently as to submerge whole streets in St. Petersburg, even up to the first floor of houses; an event against which no provision for the future has appeared possible. The Russian survey of the gulf of Finland is described in Struve's great work on the subject, of which 2 vols. had been published up to 1859, the 3d and last vol. being soon expected to appear.

FINLAY, George, a British Philhellenist and historian, born in Scotland about 1800, enlisted at an early age in the cause of Greek independence, lived much with Lord Byron before his last illness, was an associate of Dr. Howe of Boston, and since the war has resided in Athens. The appropriation of his garden by the Greek government, for which Mr. Finlay claimed a large indemnity, as the garden affords a most beautiful view of the Acropolis, gave rise to one of the many controversies between the English and Greek governments. Mr. Finlay remarked on the subject of his claim to the earl of Carlisle, who visited Athens in Nov. 1853, that "the modern Greeks wholly ignore the whole period from Alexander the Great to Lord Palmerston;" "which," as Lord Carlisle wittily adds, "is an appropriate complaint from a historian of mediæval Greece." Mr. Finlay is noted for his thorough knowledge of Greek topography, art, and antiquity, and is the author of a series of works on Greek history, comprising "History of Greece under the Romans" (1st ed., London, 1843; 2d ed., 1857), "History of Mediæval Greece and Trebizond" (1851), "History of the Byzantine and Greek Empires" (2 vols. 8vo., 1853–'4), and "History of Greece under Othoman and Venetian Dominion" (1854). He is now engaged in a work which will bring the history of Greece down from the Turkish conquest to the constitution of 1843.

FINLAY, John, a Scottish poet and biographer, born in Glasgow in 1782, died in Moffat in 1810. His principal poem, "Wallace, or the Vale of Ellerslie," was published when he was only 19 years old. The more important of his other works are: "Scottish Historical and Romantic Ballads, chiefly Ancient, with Explanatory Notes," &c. (2 vols. 8vo., Edinburgh, 1808), and a "Life of Cervantes." He also edited Blair's "Grave," and Smith's "Wealth of Nations."

FINLAYSON, George, a Scottish surgeon and traveller, born in Thurso about 1790, died on the passage from Bengal to Scotland in Aug. 1823. As surgeon of the British army he was present at the battle of Waterloo. He served also as surgeon in Ceylon and India, and in 1821 accompanied Crawfurd in his mission to the sovereigns of Siam and Hue (Cochin China), of which he wrote an interesting journal, edited and published after his death by Sir T. S. Raffles (London, 1825).

FINLEY, James Bradley, an American clergyman and author, born in North Carolina, July 1, 1781, died in Eaton, Ohio, Sept. 6, 1857. His father was a minister in the Presbyterian church, and removed to Kentucky, where he opened an academy. The son entered the Ohio M. E. conference in 1809. In 1821 he was sent as a missionary to the Wyandot Indians, among whom he remained 6 years. In 1845 he was appointed chaplain of the Ohio penitentiary. His last labors were principally in connection with a church in Cincinnati, Ohio, which bore his name, though he served temporarily as conference missionary. He was one of the most successful of western authors. His "Wyandot Mission," "Prison Life," "Autobiography," "Sketches of Western Methodism," and "Life among the Indians," have been extensively read, especially in the western states.

FINLEY, Robert, D.D., an American scholar and philanthropist, born in Princeton, N. J., in 1772, died in Athens, Ga., Oct. 3, 1817. He was graduated at Princeton college in 1787, and from 1793 to 1817 was connected with that institution, either as tutor or trustee, and during the greater part of that period was also pastor of Baskingridge. He may be regarded as the founder of the African colonization society, the plan for sending emancipated blacks to Africa having originated with him, and the constitution and organization of the society having been chiefly formed through his instrumentality. In 1817 he was chosen president of Franklin college at Athens, Ga., but did not long survive his installation in that office.

FINLEY, Samuel, D.D., president of the college of New Jersey, born in Armagh, Ireland, in 1715, died in Philadelphia, July 17, 1766. A sermon that he heard at the age of 6 years determined him to be a minister. Arriving in America in 1734, he spent several years in completing his studies, and was licensed to preach in 1740. The first part of his ministry was much occupied with itinerant labors in promoting the revival of religion, at that time so remarkable throughout the country. His zeal at one time brought him into unpleasant circumstances; for preaching in New Haven, Conn., contrary to a law of the colony forbidding itinerants to enter parishes of settled ministers without their consent, he was seized by the civil authority and carried as a vagrant beyond its limits. In 1744 he was settled at Nottingham, Md., where he remained for 7 years, and where, in addition to his ministerial duties, he carried on an academy which acquired a high reputation. On the

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death of President Davies of the college of New Jersey, he was chosen his successor, and removed to Princeton in 1761. The college flourished while under his care, which was, however, but 5 years. He published a number of sermons and discussions.

FINMARK, a province of Norway, and the northernmost region of the continent of Europe, bounded N. and N. E. by the arctic ocean, E. by Lapland, and S. by Lapland, Sweden, and the province of Nordland, with the last of which and with Drontheim it forms a division of the Norwegian government; area, about 27,000 sq. m.; pop. in 1855, 54,665. It lies wholly within the arctic circle. Its northernmost point is the North cape, a bold promontory 900 feet above the sea. Its coasts are thickly indented by long winding inlets, and are bordered by a vast number of irregular islands. It has important cod fisheries, which give employment to 3,000 vessels and between 15,000 and 16,000 men, and produce yearly about 16,000,000 fish, 21,500 barrels of cod liver oil, and 6,000 barrels of roe. The principal rivers are the Alten and Tana, the valleys of which are fertile and well cultivated. The climate of the coasts is so mild that some of the fiords never freeze. Hammerfest, an active trading place, is one of the principal towns.

FINN, Henry J., an American actor and author, born at Sydney, Cape Breton, about 1785, perished in the conflagration of the steamboat Lexington in Long Island sound on the night of Jan. 13, 1840. He went to England in his youth, on the invitation of a rich uncle residing there, and on the voyage was for many days exposed in an open boat on the sea in consequence of the shipwreck of the vessel in which he sailed. He was finally picked up by a ship and landed in Falmouth. His uncle dying without making any provision for him, he was obliged to resort to the stage for a support. After a few years he returned to New York, subsequently revisited England, and in 1822 made his first appearance at the Federal street theatre in Boston. Until his death he was one of the most popular actors on the stage, his forte being broad comedy. He accumulated a competency by his professional labors, and was travelling to his residence in Newport, R. I., at the time of his death. He enjoyed a considerable reputation as a humorous writer, and published a "Comic Annual" and a number of articles in the periodicals. He published a drama entitled "Montgomery, or the Falls of Montmorenci," which was acted with success, and he left beside a manuscript tragedy.

FINNEY, Charles G., an American preacher and author, born in Warren, Litchfield co., Conn., Aug. 29, 1792. He studied law in Jefferson co., N. Y., and in early manhood gave evidence of unusual independence of character and clearness of intellect. During this period of his life he manifested an indifference to religious matters which caused him to be regarded as a dangerous companion for young men; but under the influence of the revival of 1821 he was induced to alter his course of life, and in 1824 he commenced the career of a preacher. Having decided not to enter the pastoral office, he labored as an evangelist with great success until 1835, when he accepted a professorship in Oberlin college, Ohio. He however continued to preach in New York and elsewhere at intervals, and in 1848 went to England, where he remained 3 years. In 1852 he became president of Oberlin college, which position he still holds. His principal works are: "Lectures on Revivals" (12mo., Boston, 1835), "Lectures to Professing Christians" (8vo., Oberlin, 1836), "Sermons on Important Subjects" (8vo., New York, 1836), and "Lectures on Systematic Theology" (2 vols. 8vo., Oberlin, 1847), all of which have gone through several editions in the United States and in England. In both countries the author holds a high position among evangelical Congregationalists as an eloquent, energetic, and effective revival preacher.

FINNS, a race of men, of whom the vernacular name is *Suomilainen*, or inhabitants of the marshes, and whose number at the present day is estimated at nearly 3,000,000, inhabiting several districts of northern Europe. The *Fenni* of Tacitus, whose favorite abode was the woods and morasses of the north, were probably not the people of the region inhabited by the modern Finns. Strabo and Ptolemy placed the Φινν vaguely in the regions that afterward formed the provinces of Poland. Some centuries later Jornandes knew various tribes of Finns; but modern ethnologists have found it difficult to place them. Probably the Esthes of Jornandes and the Norwegians of Other were the Finnish race, although dwelling even south of modern Esthonia. Other found a people in the Archangel district who spoke nearly the same language as the Finns of more southern regions. Alexander von Humboldt in his "Cosmos" says: "On passing northward from the Iranian plateaux through Turan to the Uralian mountains, which separate Europe and Asia, we arrive at the primitive seat of the Finnish race; for the Ural is as much a land of the ancient Finns as the Altai is of the ancient Turks." At the period of the first Gothic invasion from Asia, it is alleged, with strong historical probability, that the shores of the Baltic were possessed by these tribes, from whom are descended the modern Finmarkers and Laplanders, who, according to Grotius and others, occupied a much more extensive territory than that within which they are now circumscribed. They had spread themselves over southern Norway and Sweden, whence in course of time they were driven away by more powerful intruders, and forced within the shelter of their rocks and morasses. It is impossible to ascertain when the first Finns entered modern Finland. In the 10th, 11th, and 12th centuries, 3 tribes were known there, the Quaines in the north, the Kyriales in the southeast, and the Ymes in the south. A popular tradition makes the Kyriales (Karelians) the first discoverers of the Swedish mines.

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The religion or mythology of the Finns of Finland was very similar to that of the Lapps and Finns about the White sea; but there are no traditions of it earlier than the missionary accounts of St. Eric. Their supreme being was Rawa, sprung from the bosom of nature. He had two sons, Wainamoinen and Ilmarainen, inventors of various arts useful to man. There was a goddess of love, Viden Ema, and a god of war, Turris, a Finnish word for battle or combat. There were many gods of the chase among this migratory people; but there were gods also for vegetable nature, with a superior divinity, Kekri, the grand protector of agriculture. Many interesting traditions remain, but are much disfigured by modern superstition. The old Finnish songs are charming, and the people are still naturally and universally musical. The Finns are a grave, laborious, industrious race, inured to hardship; brave, but self-willed and obstinate; not wanting in intelligence, kind, and hospitable. Humboldt says: "Few races exhibit greater or more remarkable differences in mental cultivation, and in the direction of their feelings, according as they have been determined by the degeneration of servitude, warlike ferocity, or a continual striving for political freedom, than the Finns, who have been so variously subdivided, although retaining kindred languages. In evidence of this we need only refer to the now peaceful population among whom the epos *Kalevala* was found, to the Huns, once celebrated for conquests that disturbed the then existing order of things, and who have long been confounded with the Mongols, and lastly, to a great and noble people, the Magyars."

FIR (*abies*, Don), the common name of a large number of coniferous trees of a pyramidal form and elegant proportions, separated from the genus *pinus* by modern botanists. The leaves of the fir arise singly from around the stem, unlike those of the pines, whose leaves are bundled up in twos or threes and enclosed at the base in thin, membranous, withered sheaths. The species of firs are numerous, but their variations are so distinct and marked that they form 4 natural tribes: I. Those whose leaves grow singly round the branches, all turned toward one side, and glaucous or white beneath, of which the most prominent is the silver fir (*A. picea*, Linn.), which inhabits exposed, dry, stony places on mountains of the middle and south of Europe, and reaches to the height of from 130 to 150 feet. At first its growth is slow, but after a few years it rapidly develops and attains a great diameter. This species is supposed to be the *abies pulcherrima* of Virgil and of Roman authors. A fine species of the American continent is the *A. grandis* (Lambert), or great Californian fir, of the height of 200 feet, having very long, narrow leaves, oblong, erect, slightly curving cones, which are from 3 to 4 inches long, the bracts or scales of the cones being very short, jagged, 2-lobed, with a short intermediate spine or point. The wood is soft, white, and inferior. A still more noble species, forming vast forests in the mountains of California, is the *A. nobilis* (Lambert), discovered by Douglas. Its timber is excellent. A highly prized ornamental species is known as the balsam fir (*A. balsamea*, Marsh.), with violet-colored, thin, narrow leaves, erect, cylindrical cones, occurring in cold springy spots, and forming small trees, rarely of 40 feet in height. From little crypts sunken beneath the smooth green bark, a clear exudation known as balsam exudes. This is gathered by puncturing the vesicles formed by the swollen fluid in the crypts, and collecting it in some hollow vessel; a slow process, as only a few drops can be collected at a time. The fluid thus obtained is also called Canada balsam, and is an admirable substance for mounting specimens for the microscope; beside which, it has much repute in treatment for pulmonary complaints, and is used as a valuable varnish for water colors. Another similar species is *A. Fraserii*, or double balsam fir, discovered by Mr. Fraser on the high mountains of Carolina, and, according to Pursh, found on the Broad mountains of Pennsylvania. Mr. G. B. Emerson met with it on Saddleback mountain, Mass. It occurs also at the White mountains in New Hampshire, and the Green mountains in Vermont; and probably it is more common than is supposed, being overlooked from its similarity to the balsam fir. The hemlock spruce (*A. Canadensis*, Mx.) is a well known and elegant tree, commonly called hemlock, no other tree vieing with it in richness of a dark green foliage, which contrasts finely in the early summer with its delicately green young shoots and leaves. Its branches are slender toward the extremities, much forked, flat and spreading, sloping downward to the ground and sweeping it, its trunk rising to the perpendicular height of 70 or 80 feet. Its wood is not at all adapted for timber, and as a fuel is only fit to burn in close stoves, but its bark is very valuable for tanning purposes. When small and young it bears clipping, and answers for hedges, resembling somewhat the yew in the shape and color of the leaves. II. The 2d group of firs are known under the name of spruce, whose leaves grow singly round the branches, and all spread equally. Of these we may notice the American white spruce (*A. alba*, Mx.), with rather glaucous leaves, 4-cornered and pointed; a small tree of inferior timber, but of value for its small, thread-like, tough roots, employed by the Canadians and Indians to sew their birchen canoes, and for its resin, which they use for pitch. The young saplings, straight, light, and durable, are used for poles in horticulture. The black spruce (*A. nigra*, Mx.) is a native of North America, to be seen probably in its most perfect condition in Maine, but extending to Newfoundland, Nova Scotia, and all the Canadas. Its trunk is perfectly straight, and it tapers regularly from the ground to the top. Its leaves are dark green, obtusely 4-sided, having numerous resinous dots. The roots penetrate just below the surface, and run horizontally 8 or 10

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feet in extent. This species seldom grows to a large size. Its wood is light, strong, elastic, and durable. The young shoots are employed in making beer. The Douglas fir (*A. Douglasii*, Lambert) is a gigantic species found in immense forests in N. W. America, from lat. 43° to 52° N. The trunks of the trees are from 100 to 180 feet high, and attain a diameter of 10 feet. The timber is heavy, firm, with few knots, and not at all liable to warp. The cones are remarkable for their long tridentate bracts, which are exserted far beyond the scales themselves. The Menzies fir (*A. Menziesii*, Lambert) is a native of northern California, and was discovered by Douglas, who describes the wood as being of excellent quality; but little is known of the habits of the tree. Its smaller naked branches are covered with hard, thin tubercles, its leaves are turned in every direction, resupinate from being twisted at the base, linear, mucronulate, incurved, silvery beneath; cones pendulous, cylindrical, 3 inches long; scales elliptic, obtuse, loose, somewhat wavy, cartilaginous and scarious, bright brown, ragged when mature on the upper margin, persistent after the seeds have dropped. III. The 3d group of firs are known as larches, whose leaves grow in clusters, and fall off in the autumn, of which the hacmatac (*A. microcarpa*, Lambert) is the most common form. It is only in deep forests that this tree attains any considerable size, usually rising to about 30 feet high. Its leaves are in little tufts, which are deciduous, leaving the branches entirely bare, excepting the small cones, which are for a long time persistent. The range of the species is from the mountains of Virginia to Hudson's bay. At lat. 65° N. it becomes very dwarf and stunted, rising only 6 or 8 feet. Its wood is compact and close-grained, of great strength and durability, superior to all the other coniferæ, and only surpassed by the oak. In beauty, however, it is inferior to the European larch (*A. larix*, Lambert), whose branches, when suffered to grow freely, sweep the ground, and whose outline is more symmetrical, and hence preferred for ornamental purposes. The European larch grows much faster also, is better adapted to drier soils, and is much used for artificial plantings. IV. The 4th group of firs embraces those whose leaves, growing in clusters, are persistent and evergreen, commonly called cedars, magnificently represented in the cedar of Lebanon (*A. cedrus*, Lambert). This species does not rise to any extraordinary height, but spreads laterally into immense branches, affording a picturesque object. There are several American species called cedars, as the arborvitæ (*thuya*) and the northern cypress or white cedar (*cupressus thuyoides*, Linn.), but they do not belong to the fir family. So the gigantic cedars of California, known as the "big tree" (*sequoia gigantea*, Torrey), on the Sierra Nevada, are not firs, but nearly related to the cypresses, and resemble the *thuya*, but have the wood of the *juniperus*.—All these species of *abies* embracing many forest trees of value, can be easily raised from seeds, and are not difficult to cultivate. Some, which produce abundance of cones every year, can be sown in rows in open ground, but there are others which need some early protection in frames or in pots. It is best to sow the seeds as soon as practicable after being gathered, as they spoil by keeping.

FIRDUSI, Ferdusi, or Ferdousi, Abul Kasim Mansoor, a Persian poet, born near Thus, in Khorassan, about A. D. 940, died in the same city in 1020. He was often called Thousi from the place of his birth, and his ordinary name (*firdus* meaning both garden and paradise) was given him either because his father was a gardener or from the excellence of his poems. Early occupying himself with the traditions concerning the ancient kings of Persia, he was invited to the court of Mahmoud of Ghaznee, where he was presented to the most distinguished scholars and poets of the time, and encouraged by the sultan to compose his great historical poem, *Shah Nameh*. He spent 35 years upon this work, which contains 60,000 verses, and relates the mythical and romantic exploits of the Persian kings from the foundation of the world, that is, from the hero Cayomers, who disputed the earth with genii, to the invasion of the Mussulmans in A. D. 636. Its most interesting portion is the account of the prowess of the hero Rustem. Receiving 60,000 silver, instead of the same number of gold dirhems promised to him by the sultan, he is said to have distributed the whole sum, in 3 equal parts, to the slave who brought it and 2 attendants of the bath where he received it, and then in revenge to have composed against the sultan the best satire in the Persian language. Forced to fly from court, he took refuge first at Mazanderan and then at Bagdad, and being finally permitted to return to his native city, he spent there the remainder of his life. The *Shah Nameh* is one of the oldest poetic monuments of Persian literature, and is regarded by the orientals as the highest authority for the primitive history of western Asia. The disciples of Zoroaster adopted it, since it contained no other mythology than their own demonology. An abridged English translation of it in prose and verse by Atkinson was published in London in 1831. The best German (abridged) edition is by Görres (Berlin, 1820), and translations of extracts appeared in Berlin in 1851 and 1853. An edition in Persian and French, by Jules Mohl, appeared in Paris (4 vols., 1838–'54).

FIRE. See Flame, Heat, Light.

FIRE ANNIHILATOR, a machine designed for extinguishing fires by discharging large quantities of gases which do not support combustion. That of Mr. Phillips is the most noted, and at several fires prepared to exhibit its merits has proved very successful. It is made of several sheet iron cylindrical vessels, set one within another. Water is contained between the two outer ones, and the steam generated from this when heated is discharged into an inner cylin-

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drical receptacle. Still within this is contained the gas-generating mixture, which is a compound of charcoal, nitre, and gypsum. An apparatus is furnished for igniting it, consisting of a bottle of chlorate of potash and sugar placed beneath another containing sulphuric acid, so arranged that the latter may be broken by a blow from without, and the contents of the two thus be made to mix and inflame. The main charge then being ignited, the gases pass in an outward direction through numerous holes perforated for their passage, and so soon as the water is sufficiently heated, its steam mixes with them, and a dense clond of vapor is projected through the opening in the top of the machine made for this purpose. In situations favorable for retaining the vapor aronnd bodies in combustion, the fire is extinguished; but when currents of air are strongly blowing, as is generally the case about burning buildings, there would seem to be little opportunity for its action. On board ships fires often occur below deck, which no doubt could be controlled by such an apparatus. Whether it has ever proved of service in case of burning bnildings not expressly prepared for its application, we are not informed. It has been proposed to construct them both in a portable form and as stationary engines on a large scale for the protection of important buildings.

FIRE ENGINE, a machine for throwing a stream of water for the purpose of extinguishing fires. The earliest notices of machines designed for this purpose are in some allusions of ancient Roman writers to an apparatus, nowhere described, which they called a *sipho*, and which some now regard rather as the name of the aqueduct pipes for supplying water to houses than as an especial fire-extinguishing machine. That they were very inefficient may be inferred from the remark of Seneca, that owing to the height of the houses at Rome it was impossible to save them when they took fire. Apollodorus the architect, perhaps, was the first to suggest the use of a kind of hose, in recommending for the conveyance of water to high places exposed to fiery darts the use of the gut of an ox having a bag filled with water affixed to it. By compressing the bag the water was made to rise in the tube. In early periods of English and French history the chief protection against destructive fires appears to have consisted in the care with which those used for domestic purposes were managed. The curfew bell, or *courre feu*, was sounded at 8 o'clock as a signal for the fires to be extinguished. (See BELL.) In Germany fires were of frequent occurrence in the 16th century and latter part of the 15th; and ordinances were established regulating the manner of building houses and the methods to be adopted in preventing fires. At Augsburg fire engines, called "instruments for fires" and "water syringes usefnl at fires," were in use in 1518. The Jesuit Caspar Schott describes one he saw at Nnremberg in 1657, which much resembled those in use at the present time · and he mentions that 40 years before he had seen a similar engine of smaller size in his native city, Königshofen. The one at Nuremberg was placed upon a sledge 10 feet long and 4 feet broad, which was drawn by 2 horses. It had a water cistern 8 feet long, 4 feet high, and 2 wide. It was moved by 28 men, and forced a stream of water an inch in diameter to the height of 80 feet. The cylinders are described as lying in a horizontal position in a box. No mention is made of an air chamber, nor of any thing more than a short flexible discharge pipe, which could be directed to one or the other side. The oldest record of fire engines in Paris is in the work of Perrault, pnblished in 1684. From this it appears that there was one in the king's library, which, though having but one cylinder, threw out the water in a continnous jet to a great height—a result attained by the use of an air chamber, of which, as introduced into the fire engine, this is the earliest notice. Destructive fires were of freqnent occurrence in Paris and in the provinces in the latter part of the 17th centnry, the work of incendiaries, who were known as *boutefeux*. In 1699 a special officer was charged with the duty of constructing, keeping in repair, and using at fires the 17 *pompes portatives* belonging to the royal service, and in 1722 the number of these had increased to 30. There were beside many others not included in this particular service. It is believed that none were provided with air chambers; for in 1725 a paper was pnblished in the *Mémoires* of the academy of sciences at Paris describing this improvement as adopted in the engines at Strasbourg, and in it no intimation is expressed of the same contrivance ever having been introduced in Paris. Leathern hose was invented about the year 1670 in Amsterdam by two Dutchmen named Van der Heide, and the apparatus was speedily introduced into all the engines of the city. They also invented the suction pipe. In 1690 the inventors published a folio volume containing engravings, the first 7 representing dangerous conflagrations at which the old engines had been used to little purpose; the 13 following represent fires which had been extinguished by the new engines, and the method of working the machines. By the estimate they present it appears that by 10 fires property had been destroyed of the value of 1,024,130 florins; but in 5 years succeeding the introduction of the new machines the losses by 40 fires amounted only to 18,355 florins. The details of construction are not given. The title of the work, which is regarded as exceedingly valuable on account of its excellent engravings, is *Beschrijving der nieuwlijks uitgevonden Slang-Brand-Spuiten*.—It was long before the inventions of the Dutch were introduced into England. At the close of the 16th centnry the only engines there known were "hand squirts," or syringes, made of brass, and holding two or three quarts of water. Some of them are still preserved in the vestry room of St. Dionis Backchurch in Fenchurch street, London. Each one required the

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labor of 3 men, one on each side to hold the instrument steady with one hand, and with the other to direct the nozzle, while the third man worked the plunger. When discharged, the piston was taken out and the nozzle was dipped into water, which flowed in and filled the body. They were afterward fitted into a portable cistern, and furnished with levers for working the pistons. About the close of the 17th century Newsham's improved engine was patented in England. This was a strong cistern of oak, placed upon wheels, furnished with pumps, air chambers, and a suction pipe of strong leather, to prevent its collapsing when the air began to be exhausted from it by the action of the pumps, through which was run a spiral piece of metal. The end for receiving the water was provided with a strainer. In case the suction pipe could not be conveniently used, the water was supplied to the cistern by buckets passed by hand —a method still practised in many places in the United States. This engine was very little improved until the early part of the present century, when some changes were introduced in it. Various other forms have been contrived, which for the most part are only modified methods of applying the principle of the force pump. Engines working on the rotary principle have proved very laborious in their operation and troublesome to keep in order. In one engine, invented by a Mr. White of Salford, England, 12 force pumps were arranged around a central air chamber, into which they all discharged. Any number of these could be worked independently; and one man only being required for each pump, the working of the engine might be commenced without the necessity of waiting the arrival of the full complement of hands. In capacity of throwing water it is stated to have surpassed other English engines worked with a greater number of men.—Modern engines consist essentially of two vertical double-acting force pumps, one under each end of a lever beam (or sometimes 4 single-acting pumps), to which are attached long brakes for many men to take hold of and work by hand. The pumps discharge into one reservoir, the upper part of which contains air, that acts as a spring to cause the water alternately introduced by each pump to flow in a uniform current through the discharge pipe. This pipe opens in the reservoir below the surface of the water, and leads without to any required distance according to the number of lengths of leathern hose that may be attached together by the brass couplings with which they are furnished. The water is discharged through a tapering metallic pipe upon the end of which is screwed a tip of any required bore, which is held in the hand to direct the stream upon the fire. A suction pipe from the lower end of the force pump is always ready to be used when necessary; but where a stream of water with sufficient head, as from the aqueduct hydrants, can be introduced, the suction pipe is not required. The machine is attached to a carriage constructed expressly for the purpose, and furnished with various implements such as are likely to be wanted in conflagrations. It usually has a reel with a quantity of hose wound upon it, but the great supplies of this are carried upon separate carriages. The brakes are long wooden arms extending over the wheels each way beyond the extremities of the engine, or sometimes transversely to the carriage, and attached at right angles to the lever beams, which are arranged along the horizontal axis placed over the centre of the carriage. They are moved up and down by men standing on the ground each side of the engine, working with others who take their position on the top. Sometimes a rope is made fast to each brake, and being passed through a block at the bottom of the carriage is hauled upon by a number of men with each down stroke. In some engines the pumps are placed horizontally, and seats are arranged upon the top for the men to sit and work as in rowing a boat. In most of the American cities each engine is managed by an organized company of volunteer firemen, whose chief emolument is in being exempted from military duty. In Boston each fireman is paid $100 annually, and a similar system has been introduced in Providence and some other cities. All act under the control of the fire commissioners or chief officers of the fire department of the city. Some companies, instead of a fire engine, have charge of the heavy utensils, as the long ladders, the great iron hooks and ropes used for pulling down the walls of buildings, which are carried upon separate carriages. These are called hook and ladder companies. A spirit of emulation among the different companies, and the interest excited in the machines by men of various trades and professions who are engaged in attending them, have led to the introduction of every possible improvement, and they may properly be regarded as the most perfect specimens of the class of mechanism to which they belong. The following is a description of a first class side stroke machine, costing $3,000, sent from New York in 1859 to Nashville, Tenn. The cylinder is of 10 inch diameter, and stroke 12 inches; brakes over 25 feet in length. All the iron and steel work is elaborately polished, and the discharge and receiving pipes, gates, suction caps, joints, rests, screw-heads, and lockers are silver-plated. The box is of rosewood, inlaid with oblong squares of pearl; at either side is an ornamental scroll-work of gold, from which appear an eagle, lion, serpent, and snake's head branching out. Upon the air chamber, which is of burnished silver, is engraved the word "Deluge," and upon the receiving pipe, also of silver, plated, appears the motto of the company: "Our aim the public good." The tips of the brakes are also of plated work. Underneath the hind axle a gong bell is set, and in front of the wheels are patent brakes to check the machine in descending hills. The wheels are painted in white and gold. It is considered good performance for a first class

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engine to throw a stream through 100 feet of hose to the vertical height of 130 feet. One built in 1857 at Pawtucket, R. I., is stated to have thrown a stream 184 feet vertically through 400 feet of hose, drawing also its supplies of water.—Steam fire engines have recently been successfully introduced in several American cities, and must eventually take the place of all the hand machines. They will be noticed after presenting the statistics and distinguishing features of the fire departments of a few of the principal cities; these data, however, are continually changing. New York numbers 47 engine companies, 58 hose companies, 14 hook and ladder and 4 hydrant companies. It has also 3 steam fire engines in use. The length of hose in the service is about 70,000 feet. Each first class engine company is allowed 60 men; the others, and the hook and ladder companies also, 40 men each; the hose 25 men, and the hydrant companies 10 men. Each company is restricted to its own district (of which there are 8), except in case of a large fire. Brooklyn has 22 engine companies of 60 men each, 3 hose companies of 40 men, and 2 hook and ladder companies of 30 men. Two steam fire engines have lately been introduced. In Boston there are 13 engine companies, entitled to 40 men each, 6 hose companies of 20 men each, 3 hook and ladder companies of 25 men each, and 1 steam fire engine manned by 16 men. Philadelphia has 43 engine companies, 37 hose companies, 5 hook and ladder companies, and 1 steam fire engine. The companies are not restricted in the number of men, some having 300 to 400 members. The total number of men engaged in the service is 6,576, viz.: 2,100 active members, 2,265 honorary members, and 2,211 contributing members. In Baltimore the fire department has recently been reorganized, and the paid system adopted in place of the former chartered "Baltimore United Fire Department." There were in this 4 engine companies, 6 hose and 2 hook and ladder companies, the number of men in each unlimited. The fire department of Cincinnati is a very efficient organization. There were recently 7 steam fire engines, 7 hand engines, and 1 hook and ladder company, all manned by 400 members, who are paid $60 a year each. The fire department of St. Louis, which lately numbered 8 forcing engines, 9 suction engines, and 14 hose carriages, has introduced a large number of steam engines, employing more than any other city, unless it be Cincinnati.—The great modern improvement in fire engines is the application of steam power to work them. This was first attempted by Mr. Brathwaite, in London, in 1830. His first engine was of barely 6 horse power, weighing a little over 5,000 lbs., was furnished with an upright boiler, in which steam was generated to a moderate working pressure in 20 minutes, and was capable of forcing about 150 gallons of water per minute from 80 to 90 feet in height. It had a steam pump of the same form as those now in common use, the steam and water pistons being on opposite ends of the same piston rod, the former being 7 inches in diameter and the latter 6½ inches, and the stroke of each 16 inches. A larger engine of the same general construction was built by Brathwaite in 1832 for the king of Prussia; but though its performances were highly spoken of, this attempt to apply the power of steam for fire-engine purposes cannot be said to have been successful. The time required for raising steam, and the great weight of the apparatus when adequate boiler power was obtained, were undoubtedly the principal difficulties. In New York, after the great fire of 1835, premiums were offered for plans of steam fire engines, and in the year 1841 an engine was built, from plans by Mr. Hodges, under a contract with the associated insurance companies, and was on several occasions brought into service at fires with good effect; but though very powerful, its great weight proved to be a fatal objection to its use, and it was at last sold and converted to other uses. To the city of Cincinnati belongs the credit of giving the first practical demonstration of the feasibility of this application of steam, and of making steam fire engines the basis of a fire department of unequalled efficiency, steam having wholly superseded hand engines, except in a few of the outermost districts of the city. The first of these engines, built by Mr. A. B. Latta, was brought out early in 1853. This was a very large, powerful engine, weighing upward of 12 tons, and requiring 4 strong horses to haul it, even with the aid of the steam which was applied to the wheels to assist in its propulsion. Two others of the same class were built in 1854, but since that time the application of the steam to the wheels, for the purpose even of partial propulsion, has been abandoned, and the weight of the first class engines brought down to 8 or 10 tons. The controlling feature of the Cincinnati engine is the boiler, which is of very peculiar construction and properties. It has a square fire box like a locomotive boiler, except that the furnace is open at the top where the chimney is set on. The upper portion of the furnace is occupied by a continuous coil of water tubes, opening above into the steam chamber, the lower end being carried through the fire box and connected with a force pump outside, by means of which the water is driven through the whole length of the coil, maintaining a forced circulation. When the fire is started the fire box is full of water, but the tubes are empty, and kept so till they get hot enough, when the forcing pump is worked by hand, and water injected, which is almost instantly converted into steam. The process is continued till steam enough is generated to work the circulating pump, which from that time is kept constantly in motion to supply the tubes. By this method, attesting not more the ingenuity than the nerve of its inventors, the Cincinnati builders solved the problem of raising steam to a working pressure within the shortest time necessary to get an engine to a fire and its attachments made;

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the time ordinarily taken for this purpose being from 5 to 10 minutes. These engines, though very heavy and somewhat complicated, are complete in all their arrangements, of great strength of construction and power of action, and in their practical operation have been triumphantly successful. One of them is said to have thrown a 1¼ inch stream 300 feet horizontally, and a distance of 250 to 260 feet for a stream of that size is a very common achievement. The lightest engine of this construction is one intended to be drawn by two horses, which weighs about 10,000 lbs., and when exhibited in New York in Nov. 1858, reached a distance of 237 feet in playing through a 1¼ inch nozzle, taking its supply from a hydrant, and discharging about 375 gallons per minute. In Cincinnati, the same engine is reported to have played 210 feet through 1,000 feet of hose, taking its water from a cistern. St. Louis, Louisville, and some other cities have supplied themselves with engines built in Cincinnati; in the two first named they have nearly superseded hand engines. In the mean time other builders have essayed their skill in the same direction, with various success, and a considerable number of engines have been put in operation in New York, Philadelphia, Boston, Chicago, Baltimore, and other cities. In Boston, in Aug. 1858, there was a trial between steam fire engines for a premium offered by the city authorities. Four engines were entered for competition: the Philadelphia, built by Rainey, Neafie, and co., of Philadelphia; the Lawrence, by the Lawrence machine shop, of Lawrence, Mass.; the Elisha Smith, by Bird and co., East Boston; and the New Era, by Hinckley and Drury, of Boston. The weight of these engines, exclusive of water, taken in the order just named, was 7,455, 7,300, 9,330, and 9,415 lbs.; the weight including water, 8,055, 7,870, 9,866, and 9,915 lbs.; the time of raising steam from cold water to 60 lbs. pressure, 11 minutes 8 seconds, 10 m. 29½ s., 13 m. 51 s., and 18 m. 21 s.; the quantity of water per minute thrown by each, in the same order as above, in a test experiment, 306, 302½, 309, and 345 galls.; the horizontal distance thrown, in playing through a 1¼ inch pipe, 163, 154½, 140, and 135 feet; the vertical throw, 110, 110, 125, and 90 feet. During these experiments, the greatest pressure of steam permitted, under the regulations adopted, was 120 lbs.; an arbitrary restriction which operated unfavorably to the Lawrence, the boiler of which was so constructed as to be safe, and to be capable of supplying an abundance of steam, when working under a much higher pressure. Under the conditions prescribed the Philadelphia was properly declared the victor, her actual performance being slightly in advance of that of the Lawrence, but the latter was really the successful engine, and was subsequently purchased by the city and placed on duty. Each of these engines was provided with an upright tubular boiler and with reciprocating steam pumps of the usual form, the peculiarities of each being in the details rather than in the general principles of construction and arrangement. Of the same character are several other engines by different builders in Philadelphia, Baltimore, and other places, none, however, showing any material advance on the results obtained with the Lawrence and Philadelphia. Of an entirely different character are the engines built at Seneca Falls, N. Y., by Silsbee, Mynderse, and co., 4 of which are in successful use in Chicago and one in Boston. In this the boiler is horizontal and rectangular, or box-shaped, and forms the bed for the machinery, which is placed on top of it, and consists of a rotary engine and a rotary pump, both on the same shaft. Both pump and engine are of the form known as the elliptical rotary, consisting in effect of a pair of cog wheels, with longer and shorter teeth alternating, working into one another inside of an elliptical case. This engine illustrates well the peculiar adaptation of the rotary movement in the pump to steam fire engine purposes, being capable of a very high speed, and consequently of dealing with much larger volumes of water than reciprocating pumps of the same capacity of chamber. As no valves are used, either in the engine or pump, all valve gear is dispensed with, and a remarkably simple and compact arrangement of machinery secured; with the serious drawback, however, of a large unbalanced pressure on the journals, and of the sacrifice of all the benefit of cut-off and expansion. An engine of this construction, of about the same weight as the Lawrence and the Philadelphia, throws a 1¼ inch stream nearly 200 feet, and raises steam to a working pressure, by the aid of a fan-blower, in from 6 to 8 minutes.—The boldest, and not the least successful movement in perfecting the application of steam to fire engine purposes, has been made by Messrs. Lee and Larned of the city of New York, who seem to have reached the furthest point at present attainable in the concentration of power within given limits of weight. An engine built by them for the Manhattan engine company of the city of New York, and put on active duty with great success in June, 1859, though intended as a hand engine, to be run by the company without aid from horses, and weighing but little over 5,000 lbs., has succeeded in throwing a 1¼ inch stream 185 feet in perpendicular height, equivalent to a horizontal throw of 247 feet, and discharging at that rate nearly 500 gallons per minute; a performance, it will be seen, quite equal to that of the largest of the two horse engines already described. The extraordinary power developed by this engine relatively to its weight depends partly on its perfection as a carriage, the suspension being so perfect that the strain on the bed and machinery, and consequently the weight of framing, are reduced to a minimum; partly on the pump, which is Cary's patent rotary, by Cary and Brainard of Brockport, N. Y. (see PUMP, ROTARY), one of the few examples of a rotary arrangement which has stood successfully the test of years; but most of all on the remarka-

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ble properties of the boiler, which is Lee and Larned's patent annular boiler, a peculiar form of the upright tubular, combining in the highest degree hitherto attained the lightness, strength, safety from explosion, and great evaporative power indispensable in steam fire engine boilers. It is composed almost wholly of tubes, boiler plate being used only in the steam dome, which is but 18 inches in depth, and in the tube sheets. The furnace is enclosed by water tubes, standing side by side like palisades, and opening into the steam drum above and a ring-shaped water bottom below, on which the grate bars rest. This arrangement gives a very high and roomy flame chamber, most favorable to perfect and effective combustion, in the middle of which is suspended a shallow water chamber perforated by numerous thimbles or short air tubes, and connected with the steam drum by a large number of water tubes, each one of which is penetrated by a smaller air tube running from the lower sheet of the water chamber to the upper sheet of the steam drum. The water of course occupies only the annular space between these concentric tubes, and this thin stratum of water is attacked by a fierce flame both around and within it, the whole arrangement giving the greatest amount of fire surface, of the most effective kind, and acting upon the smallest body of water that can possibly be combined within given limits of space and weight. With this boiler, steam is generated to working pressure in from 6 to 8 minutes, and can be maintained at the highest speed of the engine at a pressure of from 150 to 200 lbs. per inch, a pressure far within its limits of strength. The results obtained with this engine indicate that sufficient power for all ordinary purposes can be secured on the plan pursued by Lee and Larned, with engines but little if any exceeding in weight the ordinary hand engine worked by man power. The same boiler and pump have however been applied by the same builders in a form of engine which promises still more important results, designed especially for use when extraordinary power is required. In Dec. 1858, they finished for the city of New York two large first class engines, weighing each about 5½ tons, in which for the first time the power of the steam was successfully applied to the wheels to propel the engines themselves, without any aid from horses. The quantity of water thrown by these engines, and the force with which it is projected, are beyond all precedent in the history of hydraulic apparatus of a portable form. A 1¼ inch stream thrown 210 feet in perpendicular height, a 2 inch stream 180 feet, and a 2½ inch stream from an open butt the astonishing distance of 210 feet horizontally, the discharge of water in the latter case being not less than 1,200 gallons per minute, and this not in a momentary spirt, but in steady and sustained work, with steam to spare, are among the well attested feats of these powerful machines. Requiring not only no aid from horses, but carrying with it the men needed for working it, a liberal supply of fuel, and all needful hose, one of these engines is a fire department complete in itself, and in case of a conflagration among the lofty, deep, and richly stored warehouses which abound in the city of New York, must be of incalculable service. They are intended to be kept with steam up, ready to start at a moment's warning; can run at any speed which the state of the streets will permit; and on arriving at the fire, by disconnecting two rods, which is the work but of an instant, the locomotive part is thrown out of gear, and the power of the engines left to act on the pump alone. The description of this engine, considered as a locomotive, will be given more appropriately elsewhere. (See STEAM CARRIAGE.)—The number of steam fire engines in actual use is now (July, 1859) about 50, and is constantly increasing.

FIRE-FLY, the popular name of many serricorn beetles, belonging to the tribes of *elaterides* and *lampyrides*, and to the old genera *elater* and *lampyris* of Linnæus; the luminous species of the former belong to the new world, those of the latter to both hemispheres; these insects are also called fire beetles. The elaters have a firm and solid body, of an oval form; the middle portion of the sternum between the first pair of legs is prolonged into a short spine usually concealed in a cavity behind it; the antennæ in the males are simply serrated. They are called spring beetles from the faculty possessed by them of throwing themselves upward with a spring by means of the spine; as they live on plants, when they drop to the ground they often fall upon the back, whose great convexity and the shortness of the legs prevent them from turning over; the spine having been unsheathed by bending the head and thorax backward, it is made to strike with such force against the sheath by the sudden straightening of the body, that it projects the insect into the air, and gives it the chance of coming down on the feet; if unsuccessful, other attempts are made until the object is attained. Fire-flies of this tribe are numerous in tropical America and the West Indies. One of the largest and most brilliant is the night-shining elater, or lightning spring beetle, the *cucujo* of the West Indies (*pyrophorus noctilucus*, Linn.); this is more than an inch long, of a dark color, and gives a strong light from 2 oval tubercles on the dorsal surface of the thorax, and from the under surface of the segments of the body. Specimens are frequently brought alive to the United States, where they may be kept for some time if fed on sugar cane; the grub is said to be very injurious to the sugar cane by devouring the roots; one of these was once transported to Paris, and escaping into the streets, after assuming its perfect state, very much astonished the inhabitants of that city. This insect is common in summer, both in the lowlands and at moderate elevations; according to Mr. Gosse, the thoracic light is visible even in broad daylight; when undisturbed, these spots are dull white, but

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they gradually become bright when touched, the brilliancy beginning at the centre and extending until the whole tubercle shines with a rich yellowish green. The light is so intense that it will cast a shadow of any object on the opposite wall in a dark room; the under side of the thorax seems as if it were red-hot, particularly beneath the tubercles; when left to itself, the insect becomes quiet, and the light fades to a mere speck. The insect when held in the hand shows only a green light, but when flying free it diffuses a rich ruddy glow from the ventral surface; it may show the green light at any time, but the red light only when flying; the former is seldom shown during flight, but in rare instances both tints are seen, producing an exceedingly beautiful effect. The thoracic light is subject to the will of the insect, but the abdominal is by some considered involuntary; the former is intermittent, but the latter seems to be a constant red glare, which will illuminate the ground for the space of a yard square. There are more than a dozen other luminous elaters, mentioned by Illiger, found in South America, where they fly during dusk and at night, generally remaining quiet during the day. These insects are used by the natives, confined under gauze, as ornaments for their head dresses and garments; they have been usefully employed by the Indians for the purposes of illumination in their dwellings and in their journeys; several, confined in a glass vessel, give light enough to read small print by. Many is the traveller whose path has been shown to him by these insects in the forests and mountains of the West Indies, on nights when even the lightning was insufficient to disclose the surrounding dangers; in the words of Southey:

> . . . . . Innumerous tribes
> From the wood-cover swarmed, and darkness made
> Their beauties visible; awhile they streamed
> A bright blue radiance upon flowers that closed
> Their gorgeous colors from the eye of day;
> Then, motionless and dark, eluded search,
> Self-shrouded; and anon, starring the sky,
> Rose like a shower of fire.

This is one of many instances in which an acquaintance with natural history has dissipated the fears of the superstitious; the deceitful light of supposed malignant spirits has become the beautiful radiation of an insect sporting amid its inoffensive companions. These insects may be kept for weeks, if fed on sugar cane, and placed in damp moss; their light is more powerful than that of the glow-worm. The larvæ of many elaters are also more or less luminous; in the adults both sexes are luminous.—The genus *lampyris* (Fab.) includes the fire-flies of the United States and the glow-worm of Europe; they are characterized by soft and flexible bodies, straight and depressed; there is no snout, and the head in the males is occupied almost entirely by the eyes, and is much concealed by the thorax; the antennæ are short, with cylindrical and compressed articulations; the abdomen is serrated on the sides; the elytra are coriaceous, and the legs simple; the females have only rudiments of elytra at the base of the abdomen. The glow-worms of Europe, *L. noctiluca*, *L. Italica*, *L. splendidula*, and *L. hemiptera*, will be described under GLOW-WORM. In the United States there are many species, of which the *L. scintillans* (Say) and *L. corusca* (Linn.) are familiar examples. The latter is 4½ lines long; the body is oblong pubescent, brownish black; a rose-colored arched streak, dilated and yellower anteriorly, joins the elevated thoracic disk; the elytra are obsoletely carinated, with numerous minute dots; it is found as far north as 54°. Both sexes are luminous, but the light is strongest in the female; the light streams from the ventral surface of the abdomen; even the larvæ of many species, and also the eggs, are luminous. Like the elaters, they conceal themselves by day, and fly about in warm damp evenings; the males fly from plant to plant, while the female remains still, betraying herself to the other sex by her brighter light, of a bluish or greenish white tint. The luminous *lampyridæ* of tropical America are very numerous and brilliant, in the words of Humboldt, repeating on the earth the spectacle of the starry heavens; according to Gosse, their sparks, of various degrees of intensity, in proportion to the size of the species, are to be seen gleaming by scores about the margins of woods and in open places in the island of Jamaica. This writer describes many species, of which the most remarkable are *pygolampis xanthophotis* and *photuris versicolor*. *P. xanthophotis* is ½ of an inch long and ¼ of an inch wide; the elytra are smoke-black; the thorax drab, dark brown in the centre; the abdomen pale, with the last 3 or 4 segments cream-white; the light is very intense, of a rich orange color when seen abroad, but yellow when examined by the light of a candle, and intermittent, lighting up a few segments or the whole hinder part of the abdomen. *P. versicolor* is a large species, with drab-colored elytra, less brilliant in its light and less rapid in its flight than the former species; the light is of a bright green hue; it frequently rests on a twig, gradually increasing the intensity of its light to the brightest, and then by degrees extinguishing it, remaining dark a minute or two, shining and fading again like a revolving light. Sometimes one species is attracted by the other, when the intermingling of the green and orange rays presents a very beautiful appearance. Other smaller species, which fly in at the windows in summer in considerable numbers, have either a yellow or a green light. Mr. Gosse speaks of these insects in a lonely dark dell, where "the strange sounds, snorings, screeches, and ringings of nocturnal reptiles and insects, sounds unheard by day, were coming up from every part of the deep forest around, giving an almost unearthly character to the scene."—Two species of hemipterous insects, of the genus *fulgora*, are said by some authors to be luminous, though the greatest weight of negative evidence is against this statement; the muzzle in this genus is long, straight or curved upward, and the light is said

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to emanate from its extremity, whence their common name of lantern flies. The South American species (*F. laternaria*, Linn.) is a large and handsome insect, with wings varied with black and yellow; Madame Mérian asserts positively that the light from the head is so brilliant that it is easy to read by it; Count Hoffmansegg, M. Richard, and the prince of Neuwied have denied the truth of this statement; but, from the positive assertion of the above lady, the general application of the name fire-fly to this species, and the possibility that the emanation of light may be perceptible only at certain seasons of the year, it may well be that the insect possesses luminous powers. It flies high, and hovers about the summits of trees. Another species (*F. candelaria*, Fab.), from China, of a greenish color varied with orange and black, with its long snout curved upward, is said to flit among the branches of the banyan and tamarind trees, illuminating their dark recesses.—The causes which produce this light have been the subject of much discussion among naturalists; some lay the principal stress on the influence of the nervous system, others upon the respiration, others upon the circulation; chemists have asserted the presence of phosphorus in the fatty tissue whence the light seems to issue, but there is no proof of this from analysis. The most recent writers agree that the luminous tissue is made up of fat globules permeated by numerous tracheæ conveying air, with no traces of nerves or blood vessels, according to Dr. Burnett. It does not appear satisfactorily determined whether there may not be in this tissue phosphorized fats which give forth light on contact with oxygen, hydrogen, or nitrogen. Matteucci concludes from his experiments that the light is produced by the union of carbon of the fat with the oxygen in the tracheæ, by a slow combustion, and without any increase of temperature. The intermittence of the light is believed to depend on the movements of respiration, and to be entirely independent of those of the circulation, though Carus says that the light of the glow-worm grows brighter with each fresh wave of blood sent to the neighborhood of the tissue. It is probable also that the nervous system has some influence on the light, though it may not be essential to its production; as in the electric fishes we find the physical and chemical elements necessary for the production of electricity, to a great extent independent of, yet brought into harmonious action and directed by, the nervous system, so in the luminous insects we may have the chemical elements necessary for slow combustion and the production of light independent of this system, yet influenced and directed by it; the light may also be directly influenced by the action of the nerves on the respiratory function. The luminous substance grows brighter in oxygen, duller in carbonic acid, and shines even in the dead insect and under water. It is said that there is no heat accompanying this light, though it be a true combustion and a combination of carbon with oxygen; this may be owing to the rudeness or imperfection of our instruments, or to the slowness or peculiarity of the combustion. The phenomena of animal heat, electricity, and light show that organisms are to a certain extent chemical laboratories, in which the Creator performs his wonderful and ever successful experiments of life, and that the great forces of nature are the same in the external world and in the recesses of the animal system—the same throughout the universe.

FIRE-PROOFING, a term applied to processes by which fabrics or buildings are rendered proof against taking fire. Various solutions of mineral salts applied to cloths serve to cover the fibres with an uninflammable coating, protecting them from access of oxygen when heated, and thus preventing their combustion. A solution of alum is both cheap and effectual for this purpose. A process has been patented in England of preparing starch by incorporating it with phosphate of ammonia, to which for coarse fabrics a little muriate of ammonia is added, so that when applied to clothes they should be rendered to a degree incombustible. According to the description given of the process, sometimes more of the phosphate is used than of starch in making the mixture, and this is effected either by mixing the solution of each, or by grinding them together dry. On applying the mixture when treated with water in the usual way of using starch, the fabric only partially dried should be rolled in a dry cloth and left for a time before ironing; and if there should be liability of the iron's sticking, a little tallow or white wax may advantageously be added to the starch.—Several methods have been devised for rendering wood fire-proof. In the United States wooden roofs are partially secured from fire by covering them with a coating of gravel, secured by mixture with coal tar or asphaltum; and particular paints recommended as especially adapted to the purpose have been much used. A thick coating of any ochreous or other mineral paint must be serviceable according to the quantity laid on. The following is a method of Mr. Payne of England. He partially exhausts the air from a tight vessel containing the wood, lets in a solution of sulphuret of barium or of calcium, and by a force pump drives in more up to a pressure of 130 lbs. or more on the square inch; after remaining an hour, the solution is drawn off. An acid, or a solution of a salt like sulphate of iron, is next introduced, and a chemical change takes place, producing a salt of barytes or of lime, which becomes fixed in the pores of the wood. The English war department has lately caused experiments to be made to test the utility of an application of one of the cheap soluble alkaline silicates, as the silicate of soda. Specimens of wood were soaked a few hours in a weak solution of the salt, which was found to penetrate about ½ inch, and to render the wood difficult to burn. Painting the wood with the salt was equally effectual. But the best results were ob-

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tained by going over the coating of the silicate of soda with another of lime whitewash, and after this had stood a few hours coating it with another stronger solution of the soda. The first solution, it is directed, should be prepared by mixing with one measure of the thick sirup of silicate of soda 3 measures of water; the wood should be brushed over with this, as much being laid on as the wood can be made to absorb. When nearly dry, the lime wash of creamy consistence is applied, and after this has become moderately dry, the solution prepared with 2 parts of sirup to 3 of water is laid on with the brush. The covering thus prepared adhered very well, even when exposed to a stream of water and to rains; the former when striking the wood in the shape of a jet only slightly abraded it, and it was not easily removed by applying heavy blows to the wood. It was found that when the silicate was prepared so as to mix readily with water, one pound was sufficient to cover 10 square feet, and at the rate of £20 per ton of the sirup, the cost of the silicate for this amount of surface is only about twopence. By this application to the timbers and other woodwork of houses, they may be rendered comparatively safe from fire; but for important structures, the most thorough protection is in the use of wrought iron beams, built into the walls of brick or stone, and of iron or other incombustible material for the partition walls, floors, roof, and stairs. The most efficient methods in use in the United States are described in the article BEAM. Even buildings thus constructed in the most perfect manner may be completely ruined if filled with combustible goods that become once thoroughly ignited; for the beams when heated must expand, and with a force against the walls that cannot be resisted. The iron rods also used to tie the low arches of the roof fail entirely to perform their office as their length increases with the elevated temperature, and an additional strain is brought upon the walls to throw them out. Cast iron beams and columns have been shown to be more objectionable even than wood; for in case of becoming heated they rapidly lose their strength, and are liable to give way suddenly, and much sooner than timbers even when consuming. Mr. Fairbairn, experimenting in England upon the effect of increase of temperature in weakening cast iron, found that in cold blast iron $\frac{1}{3}$ the strength was lost in heating from 26° to 190° F., and in hot blast iron the loss was 15 per cent. in raising the temperature from 21° to 160° F. Should this effect continue in similar ratio with higher temperatures, the cast iron supports must lose all their useful effect much below the point at which they would begin to melt. The effect of cold water thrown upon them when moderately heated must be to materially weaken, and possibly to cause them to break. Other methods of rendering buildings partially fire-proof have been practised in Europe, but are either now given up or are little used. Such is the method of Mr. Hartley, introduced in 1775, of sheathing the timbers with thin plates of iron, the earl of Stanhope's method of filling in and coating with plaster, &c.

FIRE SHIP, a vessel occasionally used in naval warfare for carrying fire among the enemy's fleet. It is filled with very inflammable materials so arranged as to be rapidly ignited, and being navigated as near as may be to the vessels toward which it is directed, these materials are set on fire, and the ship is deserted by the crew. Vessels of this character were effectively used by the Rhodians in their war with the Syrians, 190 B. C., as stated by Livy (lib. xxxvii. cap. 30). The English also employed them in their engagements with the Spanish armada in 1588, and English works give the most detailed descriptions of the manner in which they should be prepared; but this necessarily varies greatly in actual practice, according to the means at hand and the ingenuity of the actors. The chief object to be attained is that the ship shall be in complete conflagration with the flames pouring through the port holes as she drifts near the vessels to be attacked; and in some large quantities of powder are arranged in the hold to be ignited and cause a terrible and most destructive explosion to every object near by.—In this century fire ships were effectually employed by the Greeks in their war of independence against the Turks.

FIRE WORKS. See PYROTECHNY.

FIRKIN (Dan. *fire*, four), the fourth part of a barrel, an old English measure of capacity, variously given as containing from $7\frac{1}{2}$ imperial gallons to 10.987 standard gallons. For ale its capacity was one gallon less than for beer; as usually reckoned, it was 8 gallons for the former and 9 for the latter. In the United States, firkin designates a tub, usually of butter, the weight of which should be 56 lbs. In some parts of Pennsylvania it is 110 lbs.

FIRMAMENT (Lat. *firmamentum*, support), in ancient astronomy, the 8th sphere or heaven, surrounding the 7 spheres of the planets. Two motions were attributed to it: the diurnal motion from east to west, given by the *primum mobile;* and another motion from west to east, completed, according to Ptolemy, in 36,000 years, when the fixed stars were again in precisely the same position as at the beginning. This period was called the Platonic or great year.

FIRMAN, FERMAN, or FIRMAUN, a Persian word signifying an order, employed especially in Turkey to designate any decree issued by the Porte, and authenticated by the sultan's own cipher or signet. Each of the ministers and members of the divan has the right of signing firmans relative to the business of his own department, but only the grand vizier is authorized to place at their head the cipher containing the interlaced letters of the sultan's name, which alone gives them force. A decree signed by the sultan's own hand is called *hatti-sherif.* The name firman is also applied to a Turkish passport, whether issued by the Porte or by a pasha, enjoining

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the subordinate authorities to grant the traveller bearing it protection and assistance. In India, a written permission to trade is called a firman.

FIRTH. See Frith.

FISC (Lat. *fiscus*), originally, the treasure of a prince or sovereign lord. Under the Roman empire *fiscus* designated the domain or treasure of the sovereign as distinguished from that of the state, or *ærarium publicum*. Under the later emperors it lost its distinctive character, and denoted the property of the state, a signification which it still retains in the civil law of Europe. The *fiscus*, being furnished partly from fines and the property of condemned persons, has given rise to the word confiscation, by which is meant the forfeiture of any species of property to the state or a body corporate. The fisc had a legal personal existence, similar to that of a corporation, and various officers, as *procuratores*, *advocati*, *patroni*, and *præfecti*, were employed in its administration.

FISH HAWK, a bird of prey, of the family *falconidæ*, sub-family *aquilinæ*, and genus *pandion* (Savigny). This genus, which belongs to the same sub-family with the eagles, is characterized by a short bill, curved from the base to the acute hooked tip, compressed laterally with slightly festooned margins; wings extending to tip of tail, the 2d and 3d quills equal and longest; tail moderate and rather even; general form heavier and less adapted for rapid and vigorous flight than that of the eagles; tarsi short and strong, covered with small circular scales; toes very rough beneath, long, and united at the base; claws long, curved, and sharp. Gray describes only 3 species: *P. Carolinensis* (Gmel.) in America, *P. haliaëtus* (Linn.) in the old world, and *P. leucocephalus* (Gould) in Australia. These species are nearly allied to each other, and inhabit the temperate regions, in the vicinity of lakes, rivers, and shallow arms of the sea; they have been seen several hundred miles from land, probably driven off the coast by severe storms. The female American fish hawk, or osprey, is 25 inches long, with an extent of wings of about 5 feet; the male is somewhat smaller. In the adult the head and under parts are white; a stripe through the eye, the top of the head and upper parts, wings, and tail, deep umber brown, the latter having about 8 bands of blackish brown; numerous spots of pale yellowish brown on the breast; bill and claws bluish black; tarsi and toes greenish yellow; the tibial feathers short, and the tarsus feathered one third the way down in front; the young have the upper parts edged with white. This well-known species inhabits the continent from the Atlantic to the Pacific; its powerful and protracted flight, and the dexterity which it displays in catching fish, render it conspicuous among our birds of prey. It is one of the most sociable of the hawks, migrating in considerable numbers along the coast in spring and autumn; it is mild, even timorous in its disposition, rarely quarrelling with its mates, and even nesting on the same tree with birds which other members of its family would chase or destroy; the readiness with which it yields its prey to the eagle has been alluded to under that head. It never pursues its prey in the air; flying at a moderate height above the water, when it sees a fish within its reach it closes its wings, and plunges headlong, sometimes entirely disappearing below the surface; if successful, it retires to its nest or to a tree to eat it at leisure; it is said sometimes to strike a fish too heavy for its strength to raise, and, unable to free itself, to be drawn under water and drowned. Though a heavy flier compared to the eagle, its flight is high and its motions graceful; in the rare instances in which it alights on the ground, it walks in a very awkward manner. The fish hawk appears in the middle states from the south about the beginning of April, and is welcomed by the fishermen as the forerunner of various kinds of fish; it goes southward again as winter approaches. The males arrive 8 or 10 days before the females; during the love season both sexes assist in making new nests and in repairing old ones, and in incubation; the nest is placed in the fork of a high tree near the water, and is composed of sticks, grass, and sea weeds, firmly united, 3 or 4 feet wide and as many deep. As evidence of its gentle disposition, Audubon says that he has seen the fish crow and purple grakle raising their families in nests built among the outer sticks of the fish hawk's nest. The eggs are 3 or 4 in number, broadly oval, yellowish white, with numerous large irregular spots of reddish brown; the young are carefully fed and protected, and often remain in the nest until they are as large as the parents; only one brood is raised in a season. When wounded, they defend themselves with bill and claws; they are capable of flying off with a fish weighing 5 lbs. The fish hawk of Europe resembles very much the American bird.

FISH HOOKS. The manufactnre of these little implements, used for capturing fish, is largely carried on, together with the kindred production of needles, at the village of Redditch in Worcestershire, England. Steel wire prepared from the softest and best qualities of iron is first cut into suitable lengths, and, the metal being softened by heat, 3 wires together are next cut by a knife firmly pushed in the direction to make the slit from which the barb is raised. The end is then filed by hand to a point, the wire being held with pliers against a piece of box wood. The barb is next caught into a notch at one end of a slip of brass standing edgewise in a block of wood and shaped with the same curve as the hook, and the wire is quickly bent around this slip. It thus receives the hooked form, and the obliquity is given to the curve by the workman raising the end held in the hand as the turn is given. Nearly a hook in a second can thus be bent by a single workman. The end for receiving the fastening is next flattened by a smart blow with a small hammer; and the hooks are then completed by

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the finishing processes of tempering at a sand bath heat, scouring in a rotating barrel with emery and soap, and finally blueing at the proper heat in a sand bath.—Walton, in his "Complete Angler," presents much curious information concerning fish hooks, tracing their use to the times of the prophecies of Amos, and to the still more remote writing of the book of Job, in both of which they are mentioned; and he cites their use by the apostles, which was expressly approved by our Saviour, in recommendation of his gentle art. In Bohn's late edition of his work are described the nice differences of form and qualities of the Kirby, Limerick, Kendal, and Sneck-bend hooks, and long shanks are recommended for hooks that are to be dressed with long-bodied flies, as the dragon fly, the stone fly, and the spider fly, any superfluity in length being easily nipped off. The plates of this edition present a great variety of forms for various fish, some double hooks being contrived by binding two together back to back. The Kirby hook derived its name from an ancient family, who had become famous in their manufacture. Charles Kirby, who lived in the time of Charles II., Walton states acquired from Prince Rupert the method of tempering which remained in use in the family till the time when Walton wrote (in 1760). A lineal descendant of that Charles was then making near Aldersgate street in London the hooks in best repute for shape and temper. Among recent improvements in the construction of fish hooks are—the addition of a swivel close to the shank, which admits of the hook spinning around, and thus preventing the twisting of the line; and also electro-plating the hooks, which serves to protect them from rusting, and moreover by their gilded or silvered appearance causes them to be more attractive to the fish. For the same reason the mackerel fisherman scrapes and brightens the leaden plummet in which the shank of the hook is buried for the purpose of causing it to sink quickly. In the United States there is but one manufactory for fish hooks, which is at Brooklyn, N. Y.

FISH SKIN, in the mechanical arts, is the skin of the dog fish and some other species which possess a similar hard and rasp-like integument, with scales pointed and projecting in one direction. It is used, after being dried, in the same way as glass or sand paper, and in pattern making is especially convenient for cleaning off rounded and irregular surfaces, being bent round the finger and working almost like a file. On account of not leaving behind it any sharp particles, it is sometimes to be preferred to sand paper.—For clarifying liquors, and especially coffee, the skin of the dried cod-fish is an excellent material, a small piece thrown into the boiling fluid collecting and carrying down in a few minutes all the sediment.

FISHER, a carnivorous digitigrade mammal, belonging to the family *mustelidæ*, and the genus *mustela* (Linn.); this animal (called also Pennant's marten, black cat, and pekan) and the pine marten are the only two species of the genus found in North America. The fisher (*M. Pennantii*, Erxl.) is the largest known species, the length of the body being over 2 feet, and the tail 1½ feet. The dental formula is: incisors $\frac{3}{3}$, canines $\frac{1}{1}$, premolars $\frac{4}{4}$, molars $\frac{1}{1} = \frac{38}{36}$, 38 in all; the lower carnivorous tooth has a rounded lobe on the inner side, indicating a less sanguinary disposition than that of the weasels. The general appearance is fox-like; the head is long and muzzle rather pointed; the ears short, rounded, and wide; the eyes large; body slender; tail long and bushy at the base; feet short, stout, and armed with strong sharp claws, 5 on each foot; no anal pouch, but a small gland which secretes a musky fluid. The fur is of 2 kinds, the outer long and coarse, the inner fine and soft. The general color is blackish, with a grayish tinge on the head and shoulders; some specimens are brownish, and a few with light tints; there is sometimes a white spot on the throat. Specimens vary so much in size and coloration that it has been supposed that 2 species are confounded under the name. A specimen measuring 23 inches in length of body, with the tail 14 inches, would weigh about 8½ lbs. Occasionally seen in Pennsylvania and New York, and even as far south as North Carolina, it is common in Canada and in the Lake Superior mineral region; it is found as far north as lat. 63°, and across the continent to the Pacific. It is eminently an arboreal species, very agile, though less so than the squirrel, which it is fond of pursuing; it is generally nocturnal in its habits; it preys upon hares, raccoons, squirrels, grouse, mice, and any small bird or quadruped which it can seize. Though called fisher, there is no certain evidence that it catches fish, but it is fond of the fish with which the hunter baits his traps for the pine marten; in this respect the fisher is a great nuisance, as it breaks into the traps from behind, sometimes robbing every one in a line of miles, escaping itself and preventing the capture of the more valuable pine marten. They have been often kept in confinement, where they become docile if taken when young; but the temper is very changeable, and they quickly become angry without apparent cause. From their agility, strength, and ferocity, they are difficult to obtain unless severely wounded. Like the other fur-bearing animals, the fisher's pelage is finest in winter and in high latitudes; a skin is worth about $1 50, while that of the smaller pine marten is worth $2 50; their fur is not much used in the United States, but is generally sent to Europe, where it is used for linings of more costly furs, for trimmings, and for robes. It brings forth its young once a year toward the end of spring, from 2 to 4 at a birth, depositing them in hollows in trees at a considerable height above the ground. This animal is called by Schreber *M. Canadensis*.

FISHER, Alvan, an American artist, born in Needham, Mass., Aug. 9, 1792. He was intended by his parents for a mercantile life, but at

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the age of 18 manifested so strong a taste for painting that he was allowed to study the art with an ornamental painter of merit named Pennyman. In 1814 he commenced his professional career as a portrait painter, and soon after undertook barn-yard scenes, winter pieces, portraits of animals, and in general, scenes belonging to rural life in which cattle are prominently introduced. He subsequently returned to portrait painting, which he practised for many years in Boston.

FISHER, John, an English divine, bishop of Rochester, and a zealous opponent of the reformation, born in Beverley, Yorkshire, in 1459, beheaded June 22, 1535. Having become the confessor of Margaret, countess of Richmond, he induced that lady to found St. John's and Christ's colleges at Cambridge. In 1501 he became chancellor of that university, and in 1504 bishop of Rochester. He has been supposed to have written the treatise *Assertio septem Sacramentorum*, for which Henry VIII. obtained the title of "Defender of the Faith." Though long favored by the king, Fisher fell under his displeasure by his opposition to the divorce of Catharine of Aragon. On the question of the king's spiritual supremacy being broached in 1531, the bishop firmly refused to acknowledge it. He further fell into disfavor, and was arraigned for misprision of treason, for concealing certain prophecies of Elizabeth Barton, called the holy maid of Kent, respecting the king's death. For this offence he was condemned to imprisonment during the king's pleasure, but was released on paying a fine of £300. Refusing to take the oath of allegiance in 1534, he was committed to the tower, attainted, and his bishopric declared vacant. Pope Paul III. took the opportunity to create him a cardinal; but Henry having sent Cromwell to interrogate him with regard to the appointment, and being informed that he would accept the cardinal's hat, exclaimed: "Mother of God! he shall wear it on his shoulders then, for I will leave him never a head to set it on!" The aged bishop was at once condemned on the charge of denying the king's supremacy, and was beheaded. He wrote a commentary on the 7 penitential psalms, sermons, and controversial and devotional treatises. Erasmus, his literary opponent, describes him as a man of extensive powers of mind, and for integrity, sweetness of temper, and greatness of soul, superior to most persons of his age. His life has been written by the Rev. J. Lewis (2 vols. 8vo., London, 1854).

FISHERIES, the business of catching fish upon a large scale, and the localities frequented by the kinds of fish that are the chief objects of pursuit and capture, such as the cod, herring, mackerel, and salmon. The whale fishery and the seal fishery are terms employed to designate the pursuit of the whale and the seal, though those animals are not fishes. (See Whale Fishery, and Seal Fishery.)—Among the ancients, fisheries were carried on extensively from a very early period, and formed a valuable branch of industry. Byzantium (the modern Constantinople), and Sinope on the Black sea, were famous for their lucrative fisheries. From Suetonius we learn that the *muræna* or lamprey, the favorite fish of the Romans, was caught in the greatest abundance in the sea around Sicily, and in the Carpathian sea between Crete and Rhodes. In the 3d century of our era the fishermen of the Mediterranean pursued their prey not only on the coasts, but in the open sea, making long voyages, and even passing the pillars of Hercules. The fisheries of Egypt were especially celebrated for their productiveness, but they were all inland, in lakes, canals, and the river Nile. The Egyptians regarded the sea with abhorrence, and do not seem to have fished in its waters; but of fresh-water fish they made great use, its consumption being encouraged by law. On the 9th day of the first month every person was obliged to eat a fried fish before the door of his house, except the priests, who burned instead of eating the fish. Though of a muddy flavor, and insipid compared with sea fish, the fish of Egypt seems to have been highly prized. The Israelites remembered with regret "the fish which (they) did eat in Egypt freely." The revenues arising from the fisheries of Lake Mœris were given to the queen of Egypt for pin money, and are said to have amounted to $470,000 annually.—The earliest mention of the herring fishery that has reached us dates from A. D. 709. The cod fishery began to be regulated by legislation in western Europe toward the end of the 9th century. From an ordinance of Charles VI. in 1415 it appears that the mackerel fishery of France at that period was very extensive, and that the fish were sold at an extremely low rate in the markets of Paris. The development of the fisheries during the middle ages was greatly promoted by the demand for fish that was created by the fasts of the church. But the discovery, at the end of the 15th century, of Newfoundland and its fisheries, which to this day surpass all others in magnitude and value, gave the greatest impulse to the business. The cod, mackerel, and herring are the chief objects of pursuit, and their range is not limited to the neighborhood of Newfoundland, but they are caught in vast numbers on the coast of New England, in all the bays and inlets of the British maritime possessions, and on the coast of Labrador. The French were the first Europeans who engaged in the American cod fishery. They visited Newfoundland as early as 1504. In 1508 one Thomas Aubert made a fishing voyage from Dieppe to the gulf of St. Lawrence, and after that the Newfoundland fisheries increased so rapidly that in 1517 they gave employment to 50 vessels from different nations, chiefly, however, from France. In 1577 there were 150 French vessels engaged in the business, which they pursued with great success. A few years later the government of Henry IV. took active measures to protect and encourage the cod

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fishery. Early in the 17th century, however, the business began to decline, so that in 1645 the number of French vessels employed in it was 50 less than in 1577. At this period began those angry contests between the French and English about the sovereignty of the fishing grounds, which continued, with more or less violence, for upward of a century. After the treaty of Ryswick in 1697, the French claimed the exclusive ownership of the American fisheries, and their cruisers seized and confiscated all British fishing vessels found anywhere east of the Kennebec river, in Maine, except on the western coast of Newfoundland, where, by a specific stipulation of the treaty of Ryswick, the English were permitted to fish. These pretensions of France to the monopoly of the fishing grounds were among the causes of the war declared by England in 1702. By the treaty of peace in 1713 the French fishermen were prohibited from coming within 30 leagues of the coast of Nova Scotia, and the right of England to the whole of Newfoundland was acknowledged, though it was conceded that the French should have the privilege of fishing on the eastern coast of that island, from Cape Bonavista to the northern point, thence along the western shores as far as Point Riche. The concession to France of even this limited right to the American fisheries was vehemently condemned in England. The earl of Oxford, one of Queen Anne's ministers, was impeached for high treason in 1717, and among the charges against him it was alleged "that in defiance of an express act of parliament, as well as in contempt of the frequent and earnest representations of the merchants of Great Britain and of the commissioners of trade and plantations," he had advised his sovereign that "the subjects of France should have the liberty of fishing and drying fish in Newfoundland." The French, however, notwithstanding their exclusion from Nova Scotia, and from most of the coast of Newfoundland, continued to pursue the fisheries with energy and success. They settled on the island of Cape Breton, where they built the famous town and fortress of Louisburg, at an expense of 30,000,000 livres, to protect and facilitate the fisheries. In 1721 their fleet of fishing vessels is said to have increased to 400 sail, a greater number than at any former period. A quarter of a century later the number of their vessels was computed at 600, manned by 27,000 men, and producing fish to the annual value of $4,500,000. Louisburg was the great rendezvous of the French fishermen, and soon acquired an immense importance in American affairs. "More than 200 pieces of cannon were mounted to defend it," says Sabine. "So great was its strength that it was called the Dunkirk of America. It had nunneries and palaces, terraces and gardens. That such a city rose upon a lone, desolate isle, in the infancy of American colonization, appears incredible. Explanation is found alone in the fishing enthusiasm of the period." In 1745 this stronghold was besieged and captured by a volunteer force from New England, largely composed of fishermen, and led by Sir William Pepperell, the son of a fisherman of the Isles of Shoals. He was made a baronet for this exploit, which excited the greatest enthusiasm in England, where it was considered "an equivalent for all the successes of the French upon the continent." The first lord of the admiralty declared that "if France was master of Portsmouth, he would hang the man who should give Cape Breton in exchange." The French fisheries declined rapidly after the fall of Louisburg, so that of 500 vessels that constituted the fishing fleet of France in 1745 only 100 remained in 1746. By the treaty of Paris in 1763 it was agreed that the French should have the liberty of fishing and drying fish on a part of the coasts of Newfoundland, and of fishing in the gulf of St. Lawrence at the distance of 3 leagues and upward from the shore, and on the coasts of Cape Breton at the distance of 15 leagues from the shore. The little islands of St. Pierre and Miquelon near the S. coast of Newfoundland were ceded to France to serve as shelter for the French fishermen. A few years later, in 1768, the number of French vessels at Newfoundland had increased to 259. By the treaty of peace in 1783 the right of the French to Miquelon and St. Pierre was confirmed, but, as was alleged, to prevent quarrels, France renounced her right to fish on that part of the coast of Newfoundland which stretches from Cape Bonavista to Cape St. John or Point Riche. The French revolution was disastrous to the fisheries, so that in 1792 the number of Frenchmen engaged in them in the North American seas was less than 3,400. During the reign of Napoleon they continued to languish, and the fishermen met with severe losses from the British cruisers. After the peace of 1815 the business rapidly increased, till in 1852 the cod fishery alone employed 450 ships and 14,000 seamen. In 1856 the products of the French fisheries were officially estimated to be worth 16,100,000 francs. The protection and encouragement of this great branch of national industry has from its commencement been sedulously attended to by the French government. Bounties to a large amount are granted to the fishermen. At present, under a law passed in 1851, the bounties to the cod fisheries are as follows: for each man of the crew of a vessel employed on the coast of Newfoundland or Iceland, 50 francs; for each metric quintal (220½ lbs.) of dry codfish, 20, 16, or 12 francs, according to the country to which it is shipped, the highest bounty being given on codfish shipped to the French colonies in America, India, and the west coast of Africa.—Sebastian Cabot on his return from his voyage of discovery in 1497 first called the attention of the English to the American fisheries, by pointing out the abundance of fish in the seas around Newfoundland and Labrador. The first English voyages in quest of fish, however, of which we have any account, were in 1517. In 1522, 40 or 50 houses for the accommodation of

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fishermen were built in Newfoundland, which may thus claim to be much the oldest English colony in America, though no permanent settlement was effected till about a century later. In 1548 parliament, to encourage the fisheries, passed an act laying heavy penalties on persons convicted of eating flesh on fish days. At the same time restrictions previously existing were removed, and the Newfoundland fishery made free to every English subject. In 1563 another act was passed providing that "for the maintenance of shipping, the increase of fishermen and marines, and for the sparing of the fresh victual of the realm, it shall not be lawful for any one to eat flesh on Wednesdays and Saturdays, unless under the forfeiture of £3 for each offence." The sick and those who had bought special licenses were excepted from the action of this statute. But as under these laws the mass of the people were compelled for 153 days of the year to abstain from meat, the demand for fish was of course very great. In 1583 Sir Humphrey Gilbert took possession of Newfoundland under the first charter granted in England for colonization in America, and from this act of Sir Humphrey and from the discovery by Cabot in 1497, England derives her right to Newfoundland and its fishing grounds. At the beginning of the 17th century it is estimated that 200 English ships went annually to Newfoundland, and that they employed in catching and curing the fish not less than 10,000 men and boys. In 1602 Bartholomew Gosnold explored the coast of New England, and, catching cod near the southern cape of Massachusetts, gave it the name it bears. Capt. John Smith followed in 1614, and on the coast of Maine took and dried or pickled 47,000 fish, the profits from which, and from the furs he bought of the Indians, amounted to $7,000. From this time the fisheries on the coast of New England began to be prosecuted with vigor. In 1616 full fares were taken by 8 English ships, and sold at high prices in Spain and the Canary islands. In 1620 the island of Monhegan off the coast of Maine had become a noted fishing station, and in 1622 profitable fishing voyages to New England were made by 35 English ships. In 1621 an angry controversy arose in England in consequence of a claim set up by the "council of Plymouth," a company chartered by James I., to the monopoly of fishing in the American seas between the 40th and 48th degrees of N. latitude. This company demanded from each vessel fishing in these waters a tax of about 83 cents a ton. This claim was stontly resisted. The house of commons took part with the fishermen, and the contest was continued into the reign of Charles I., and was one of the causes of the quarrel between him and parliament, which brought on the civil war. In 1639 the province of Massachusetts passed an act for the encouragement of the fisheries, exempting fishing vessels from all duties or taxes for 7 years. The English fleet at Newfoundland about this time had dwindled from 400 to 150 sail, partly from the diminished consumption of fish in Europe owing to the growth of Protestantism, and partly from the increase of the coast fishery by the settlers on Newfoundland. Charles II., in 1660, issued a proclamation for the strict observance of Lent, assigning as one reason "the good it produces in the employment of fishermen." In the same year parliament passed an act remitting the duty on salt used in curing fish, and exempting all fishing materials from customs and excise. Still the number of fishing vessels continued to decline, till in 1670 only 80 were sent out. To revive the trade the barbarous expedient was resorted to of breaking up the settlements in Newfoundland from which boat fishing was carried on, and the fishermen were accordingly driven off and their dwellings burned by Sir John Berry, who was sent over for that purpose. This harsh measure increased the number of fishing vessels, which in 1674 had risen to 270, employing 10,800 men. Toward the end of the century settlers were again allowed to dwell in Newfoundland, and in 1729 the number of resident inhabitants was estimated at 6,000. The boat fishery of the colonists again supplanted the fishery in vessels of large size, and to encourage the home merchants parliament in 1775 allowed a bounty of £40 to each of the first 25 ships, £20 to the next 100, and £10 to the second 100 that should make fares of fish before the middle of July and return to the fishing grounds for a second lading. At this time the whole number of British subjects employed in the Newfoundland fisheries was 23,652, all of whom, it is said, became sailors. The English fisheries were exceedingly prosperous between 1795 and 1815. In 1814, 1,200,000 quintals of fish were produced, worth $12,000,000. There have been great fluctuations since then both in the number of fish taken and in their price in the market, but the average annual catch of codfish by the English fishermen is computed at a million of quintals of 112 lbs. each. They are sold chiefly in the British islands, in British America, and in Portugal, Italy, Spain, Brazil, and the West Indies. The home fisheries of the British islands are of great extent and importance, the surrounding seas swarming with herring, mackerel, cod, and other species. The formation of railroads has greatly increased the consumption of fish by rendering it possible for the inhabitants of the most interior parts of the kingdom to obtain sea fish in a few hours after they are caught. In Birmingham, for example, the annual demand has risen since the opening of railways from 400 to 4,000 tons. A very productive salmon fishery is carried on in the Scottish and Irish rivers. The east coast of Scotland is the chief seat of the herring fishery, the annual product of which is computed at 650,000 barrels, worth, at 16s. a barrel, £520,000. The total value of the British fisheries is estimated at £4,500,000. The coast and river fisheries of the British islands, after deducting all expenses, yield a profit of £1,500,000. Among other European nations, the Dutch for several centuries

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took the lead in the fisheries, and the herring fishery was long a chief source of their wealth. It has, however, much declined, though it still employs about 1,600 vessels and 8,000 men, and produces an average annual amount of 4,000,000 florins. There is also a productive cod fishery carried on upon the Dogger bank, which lies between Holland and England. The Norwegian cod fisheries are extremely valuable, and are carried on chiefly from the province of Finmark, which has employed in them 3,000 vessels and 15,000 men. Their average annual product is stated at 16,000,000 fish, 21,500 barrels of cod-liver oil, and 26,000 barrels of roe, the total value of which is estimated at $1,500,000. There is also a salmon fishery of great value carried on in the rivers of Norway. Lobsters to the number of 100,000 annually are sent to London, and in some years shark fishing is pursued with much success. In 1846, 20,000 sharks were taken by 8 vessels fitted out for the purpose. The inland fisheries of Russia are among the most productive in the world. The value of the sturgeon annually caught in the waters of Astrakhan, and in the Kur and the Emba, is $1,750,000. The total value of the Caspian fisheries is estimated at $2,500,000. The waters of China abound in fish, and it is estimated by high authority that one tenth of the people of that empire derive their food from the water. The coasts are crowded with enterprising and industrious fishermen, and beside the net and the hook, a great variety of ingenious expedients are used to capture the fish. In the eastern provinces, cormorants are trained in great numbers to catch fish, which they bring to their master, who sits in a boat from which he oversees at the same time 12 or 15 of the birds.—The great sea fisheries of the United States are mostly carried on from New England. They date from the earliest settlement of the country, it being probable that among the motives that led to the colonization of Massachusetts was the hope of profit from the fisheries on the coast, which Smith, Archer, Brereton, and other writers of the day represented as surpassing even those of Newfoundland. Edward Winslow, in his "Narrative of the true Grounds and Causes of the First Planting of New England," relates an interview between James I. and the agent of the Puritans who went over to England from Leyden in 1618 to solicit his consent to their going to America. The king asked them: "What profit might arise?" They answered: "Fishing." Upon which James replied: "So God have my soul, 'tis an honest trade; 'twas the apostles' own calling." Very soon after their arrival at Plymouth the pilgrims engaged in the fisheries. In 1624 they sent to England a ship laden with fish, and in the next year two others with fish and furs. In 1628 they were selling fish to the Dutch at New Amsterdam. About 1670 the profits of the mackerel, bass, and herring fisheries at Cape Cod were granted to found a free school, which was opened in 1671. From Boston fish began to be exported as early as 1633. In 1639 the general court of Massachusetts passed an act to encourage the fisheries by exempting fishing vessels and all property connected with them from taxes and duties for 7 years. At the close of the 17th century the merchants of Massachusetts exported annually about 100,000 quintals of codfish, worth $400,000, to Portugal, Spain, and Italy. In 1731 the fisheries of the colony employed 5,000 or 6,000 men. Ten years later the number of fishing vessels belonging to Massachusetts was 400, beside as many shallops and undecked boats. The annual produce of the cod fishery was about 230,000 quintals, of which $700,000 worth was exported. At the outbreak of the revolutionary contest the fishing towns were rich and populous. Marblehead was second only to Boston in population and property. In 1775, in the hope of starving New England into submission, the British parliament passed the act to deprive the colonies of the right of fishing on the banks of Newfoundland. The breaking out of hostilities, which soon followed, nearly destroyed the fisheries for a time. The fishermen of New England turned their attention to privateering, and of the 200,000 tons of British shipping captured during the war it is computed that at least one-half was taken by them. Marblehead sent an entire regiment of men to Washington's army, and so great were its sacrifices and losses that at the end of the war the town reckoned 600 widows and 1,000 fatherless children in a population of less than 4,000. The towns of Salem and Beverly fitted out against the enemy in the course of the contest 52 vessels with 750 guns and nearly 4,000 seamen. The capture of the fishing region from the English was a favorite project with the revolutionary leaders, and much negotiation upon the subject was held with the French government, which was offered, in case of success, possession of one half of Newfoundland and equal rights with the Americans in the waters of the fishing grounds. These projects, however, resulted in nothing. In the negotiation of the treaty of peace at the end of the war, the right of the Americans to a share in the fisheries was secured by the firmness of John Adams, who made the concession of that right an ultimatum in the discussions with the British commissioners. By the treaty it was agreed "that the people of the United States shall continue to enjoy unmolested the right to take fish of every kind on the Grand bank, and on all the other banks of Newfoundland; also in the gulf of St. Lawrence, and at all other places in the sea where the inhabitants of both countries used at any time heretofore to fish; and also, that the inhabitants of the United States shall have liberty to take fish of every kind on such part of the coast of Newfoundland as British fishermen shall use, and also on the coasts, bays, and creeks of all other of his Britannic majesty's dominions in America." To check the growth of the United States fisheries and to promote those of their own colo-

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nies, the British government issued an order in council, July, 1783, prohibiting American fish from being carried to the British West Indies, which had been before the war one of the best markets for the New England trade in fish. The federal government early recognized the importance of the fisheries and the necessity of encouraging them by legislative action. In 1789 congress passed an act granting a bounty of 5 cents per quintal on dried and pickled fish exported from the United States, and imposing a duty of 50 cents per quintal on foreign fish. In 1792 the bounty on dried and pickled fish was abolished, and a specific allowance was made to vessels employed in the cod fishery: to boats between 5 and 20 tons, $1 per ton annually; to those between 20 and 30 tons, 50 cents per ton additional; and to those more than 30 tons, $2 50 per ton; but the annual allowance to any one vessel was limited to $170. In 1797 these rates were increased. Vessels of the smallest class were allowed $1 60 per ton annually; vessels upward of 20 tons, $2 40 per ton; and the maximum was fixed at $272. During the war with England in 1812–'15 the enemy's cruisers kept the fishermen from the distant fishing grounds. Many of them entered the navy, and the frigate Constitution was chiefly manned by them. They fitted out privateers in great numbers, and though remarkably successful in their new pursuit, so great was the number who were exposed to the chances of war that among the prisoners discharged from Dartmoor on the conclusion of peace there were 500 men from the little town of Marblehead alone. In the negotiations for peace the English commissioners strove earnestly to procure the consent of the American commissioners to a relinquishment of the right of the United States to the use of the fishing grounds, but the latter were instructed to break off the negotiation and come home, rather than allow the question of surrendering the fisheries to be discussed. The British, however, maintained, even after peace was concluded, that the state of hostilities had abrogated the concession of rights made in 1783. Discussions ensued between the two governments, which resulted, in 1818, in a convention, by which it was agreed that the Americans should have the liberty of taking fish on the southern coast of Newfoundland between Cape Ray and the Rameau islands; from Cape Ray to the Quirpon islands; on the shores of the Magdalene islands; and also on the southern coast of Labrador from Mount Joly to and through the straits of Belleisle, and thence northwardly indefinitely along the coast. The United States on their part renounced formally the right of fishing on or within 3 marine miles of the British dominions in America not included in the above specified limits. The act of congress now in force respecting fishing bounties was passed in 1819. It requires that vessels claiming bounty shall have been exclusively employed in the cod fishery at sea a specified period between the last day of February and the last day of November; the master and ¾ of the crew must be citizens of the United States, and very stringent proof must be laid before the collector of the district to which the vessel belongs, that all the requisitions have been complied with. The bounties allowed are: to vessels between 5 and 30 tons, $3 50 per ton; more than 30 tons, $4 per ton; no vessel to receive more than $360. The average annual amount of these bounties, of late years, is about $350,000. In the summer of 1852 serious troubles broke out on the fishing grounds of British America between the American fishermen and the British authorities, who claimed the right to exclude the former from the bays and inlets of the British possessions. This claim, which was supported by an armed naval force, was regarded by the United States as illegal, and the war steamers Princeton and Fulton were sent to the coast of Nova Scotia to protect the rights of the fishermen. The dispute was temporarily settled by mutual concessions, and in 1854 a reciprocity treaty was agreed upon by the two countries, containing the following stipulations concerning the fisheries: "The inhabitants of the United States shall have, in common with the subjects of her Britannic majesty, the liberty to take fish of every kind except shell fish on the sea coasts and shores, and in the bays, harbors, and creeks of Canada, New Brunswick, Nova Scotia, Prince Edward's island, and of the several islands thereunto adjacent, without being restricted to any distance from the shore, with permission to land upon the coasts and shores of those colonies, and the islands thereof, and also upon the Magdalene islands, for the purpose of drying their nets and curing their fish." It was specified that the liberty thus granted should apply solely to sea fisheries, and not to salmon, shad, or other river fisheries; and that the fishermen should not interfere with the rights of private property, or trespass on parts of the shore occupied by British fishermen. Similar rights, with similar reservations, were granted to British fishermen on the coast of the United States north of lat. 36°. The total value of the products of the sea fisheries of the United States exported during the year ending June 30, 1858, was $3,550,295. Of this sum $2,865,847 was the product of the whale fishery, and $684,448 of the cod, mackerel, and herring fisheries. The island of Hayti took of the exports of the latter fisheries the amount of $233,056, or more than one third of the whole. The next best customer was Cuba, which took to the value of $129,623.

—Beside the sea fisheries, the river and lake fisheries of the United States are of great importance. There are valuable shad fisheries in the Connecticut, Hudson, Delaware, Potomac, and other rivers falling into the Atlantic. The great lake fisheries are those of Erie, Huron, Michigan, and Superior. The white fish is the principal object of pursuit, though trout and pickerel are caught in large quantities. The amount taken annually is estimated at 45,000

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barrels, which are worth nearly $500,000. From the rivers flowing into the lakes, about 10,000 barrels of pickerel, worth $85,000, are annually taken. The fisheries of the Pacific coast of the United States are yet in their infancy, but the rivers of that region abound in salmon of the finest quality, of which a great amount is already annually caught.—See "Report on the principal Fisheries of the American Seas," by Lorenzo Sabine (Washington, 1852); "Report on the Sea and River Fisheries of New Brunswick," by M. H. Perley (Fredericton, 1852).

FISHES, the lowest class of vertebrated animals, red-blooded, breathing through the medium of water by means of *branchiæ* or gills. Like other vertebrates, they have an internal skeleton, the brain and spinal cord protected by a bony cavity and canal, muscles external to the bones, never more than 4 extremities, and the organs of special sense in the cavities of the head; living in a medium heavier than air, and very nearly of the same density as their bodies, locomotion is comparatively easy, and their form, fins, and smooth surface are admirably calculated for rapid progression; breathing by means of air contained in the water, their blood is cold, and consequently their vital energy is less than that of mammals and birds. The brain is very small, and the organs of sense calculated to receive only the simplest impressions of sight, smell, hearing, taste, and touch; generally unable to make any sounds, with an inflexible body, simply articulated limbs, fixed and staring eyes, living in comparative darkness and silence, there is no change in their countenance, no expression of feeling or emotion, no apparent motives in their monotonous existence beyond the necessity of supplying themselves with food, escaping from their enemies, and providing for the continuance of their species. Their chief pleasure is that of eating, and their only danger is from the superior strength and quickness of other inhabitants of the waters or from the artifices of man; to eat, and to avoid being eaten, are the great occupations of their lives, and the varieties of their forms, their instincts, and their favorite haunts, are intimately connected with these objects; the movable filaments of the *lophius* or goose fish, the prolonged snout of the pipe fish and chætodon, the wing-like expansions of the flying fish, and the electric armature of the torpedo and gymnotus, are all instruments either for offence, defence, or escape. Cold-blooded, they are little sensitive to changes of temperature, and their migrations and seasons of propagation are less influenced by thermometric conditions than are those of the higher vertebrates; many fishes spawn in winter, and it is in the cold northern waters that the innumerable individuals of the cod and herring species are pursued by man. Even the loves of fishes are marked by the same *sang froid;* very few species have sexual union; in most, the males pursue the eggs rather than the females, and coldly fecundate the spawn of unknown adults, from which arise young which they will never recognize and probably never see. A few females, as the stickleback, deposit eggs in nests made by the males; some carry their eggs and even their young with them for a short period, and feed and protect their little ones like true mothers; but, as a general rule, the joys of maternity are unknown among fishes, and the sexes care nothing for each other even in the breeding season. With all this apparent lack of enjoyment, and low position in the vertebrated series, the class of fishes displays as much and perhaps more variety and elegance of form and beauty of coloration than the more psychically favored birds and mammals; there is not a color of the rainbow, nor a metallic reflection, nor the hue of a precious stone, which may not be seen in the bands, spots, and scales of fishes. Their beauty, therefore, as well as their utility as food, early drew attention to these inhabitants of the waters; many tribes of men, both savage and civilized, obtain their principal nourishment from the sea; the countless numbers of cod, mackerel, herring, and other migrating fishes, give employment to thousands of men, and prove important items of national wealth; on the one hand, the poorest person may satisfy his hunger in the cheapest manner with fish, and on the other, the wealthy epicure may tempt his palate by the most expensive luxuries from the same sea; the aristocratic salmon and turbot swim side by side with the plebeian tribes. The habits of fishes, even of the most common species, are comparatively little known from the difficulty of observing them in their native haunts; we know that some are solitary, and others gregarious; some great wanderers, others restricted within narrow limits; some surface swimmers, others remaining near the bottom or at great depths; some living on sandy bottoms, others in rocky, others in muddy localities; some found only in salt water, others only in fresh, others in both or in brackish waters; some seen only near the shore, others in very deep water far from land; some sluggish like the skates, others active like the sharks and scomberoids; some perish quickly out of the water, as those with widely open gills like the herring, others live a long time after being caught like the eel, or can travel over land or climb trees like the anabas scandens. It is to be hoped that the study of fishes in aquaria will furnish valuable additions to our knowledge of the most common species. When we consider that more than two thirds of the surface of the globe is covered by the sea, and that a large part of the continents is occupied by lakes, rivers, and marshes, we may understand the importance of this class of animals in the economy of nature.—The external form of fishes is very various, but the head is not separated from the body by a distinct neck, and the trunk generally is continued gradually into the tail; in the skates the tail is long and distinct from the body. The body may be rounded as in the diodon, cylindrical as in the eel, compressed horizontally as in the rays, or

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flattened vertically as in most fishes; the head may be larger than the body as in the goose fish, compressed, angular, and obtuse, as in the bullhead, prolonged into a beak as in the pipe fish, or the upper jaw may project over the mouth as in the sword fish and sharks; the mouth may open on the under or upper surface, or, as is usual, at the end of the snout, with a greater or less extent of gape. The nostrils may be single as in the sharks and rays, or double as in most fishes. The eyes vary greatly in size and in direction; generally on the sides of the head, in the *uranoscopus* they look upward, and in the flounder family both are on one side. In the cartilaginous fishes the external borders of the gills are attached to the skin, and the gill openings correspond in number to the intervals between the branchiæ; but in the osseous fishes there is a single large gill opening on each side, just behind the head, serving for the exit of the water after it has been swallowed and made to pass over the gills, the flapping of the gill covers assisting the respiratory process. Some of the apodal or murænoid fishes have hardly the rudiments of fins; in others, the fins are either vertical and on the median line, or lateral and in pairs. The lateral fins are the pectorals and the ventrals, corresponding to the anterior and posterior limbs of higher animals; the pectorals are attached behind the opening of the gills; the ventrals are generally on the lower surface of the body, and may be variously placed from under the throat, even in advance of the pectorals, to the origin of the tail. The vertical fins serve the purposes of keel and rudder, and are the dorsal on the back, the anal under the tail, and the caudal at the end of the body. All these fins vary in size and in the number of rays which sustain them, being sometimes spiny, sometimes soft, branched, and composed of many small joints. In the old system of nomenclature, the malacopterygians are bony fishes with soft articulated fin rays, the acanthopterygians, bony fishes in which some of the rays are spiny, and the chondropterygians, the so-called cartilaginous fishes; these classes have been variously subdivided, and the reader is referred to the article ICHTHYOLOGY for the numerous classifications from Artedi to Agassiz. The anus may open far behind the ventrals, move forward with them, and in their absence be situated even under the throat, as in *sternarchus;* the jaws may be armed with different kinds of teeth, which often exist also on the tongue and various parts of the mouth and throat; the lips may be provided with sensitive barbels as in the horn pout, or with fleshy appendages as in the sea raven (*hemitripterus*). The skin may be nearly naked, or covered with very small scales; the scales may be rough grains as in the sharks, thick plates as in the sturgeon, a smooth enamelled coat of mail as in the *lepidosteus*, smooth as in the herring, or serrated as in the perch. Along the side of the body is the lateral line, formed by a series of pores, the outlets of the muciparous glands; this line extends from the head to the caudal fin, generally at the mid height of the body, nearer the back in some fishes than in others, sometimes ceasing long before the region of the tail, and occasionally multiple; the scales along this line are arched, notched, or perforated for the protection of the ducts; they are sometimes larger or smaller than the rest, and may be the only ones present; they often have strange forms and armatures. In various parts of the body, but especially about the head, are numerous pores, or water tubes, by which water is introduced into the system, even into the circulation; some are situated along the lateral line. The tissue of the fish skeleton is either cartilage, fibro-cartilage, or bone; the first is found in the sharks and rays, the second in the sun-fish (*orthagoriscus*) and goose fish (*lophius*), and the last in common fishes; the chemical composition is that of other vertebrates, principally the phosphate and carbonate of lime. The osteology of the head, branchial apparatus, trunk, and limbs, has been already given, as fully as the limits of this work will allow, in the article COMPARATIVE ANATOMY (vol. v. p. 558); for further details see Cuvier and Valenciennes, vol. i., and Owen on "Fishes."—Most fishes are quick in their movements; the salmon, for instance, can swim at the rate of 25 feet in a second, and can with ease pass over 20 to 25 miles in an hour; progression is effected by lateral strokes of the water by the alternate flexions of the tail and trunk; the manner in which the vertebræ are connected allows easy motion of the spine from side to side, and the muscles destined to move it are so largely developed as to form the principal bulk of the body; while the vertical fins increase the amount of oar-like surface for purposes of locomotion, the pectorals and ventrals keep the fish in an upright position, and assist in directing its course; the movements of the gill covers, by forcing backward the water which is passing between them, contribute to propel the fish forward. In the pipe fish (*syngnathus*) the dorsal fin in its vibration resembles that of the screw of a steam propeller, and, with a similar action of the tail, causes a forward or backward motion without any apparent movement of the body; the nice adjustment of the movements of the fins of the pickerel, so that while every ray seems in action the fish is perfectly stationary, must have been noticed by every angler. The movements of fish in a vertical direction are greatly assisted by the swimming or air bladder, which, though anatomically a rudimentary lung, by the air which it secretes enables the fishes that have it to rise or fall in the water by compression or extension exercised by the ribs; it is placed in the abdomen, under the spine, and communicates often with the œsophagus or stomach; the air is a product of secretion, and its containing reservoir is sometimes a shut sac; it is often wanting in some species of a genus when others possess it, and is generally very small or absent in ground fish, such as skates and turbots; in

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some cases it is considerably vascular, resembling very much a pulmonary sac. The muscles of fish are generally pale and comparatively soft, divided into parallel layers by aponeurotic laminæ; the flavor and odor are very different from those of flesh, and the gases of decomposition are much more fetid. Some fish have a singular apparatus by which they adhere to other bodies, animate or inanimate; in the remora, of the genus *echeneis*, there is a flattened disk on the top of the head, composed of movable cartilaginous plates, by which it fixes itself to stones or the bodies of other fishes; in the lump fish and other *discoboli*, the ventrals are arranged to act as suckers for attaching them to various substances; the lamprey eel (*petromyzon*) also attaches itself by the mouth to stones and fishes. Referring the reader to COMPARATIVE ANATOMY for details on the nervous system, the organs of sense, the scales, and the digestive apparatus, only general points of interest need be mentioned here. The cavity of the skull is very small compared to the size of the body, and the brain is far from filling it, a considerable space being occupied by a spongy fatty substance; the lobes are placed one behind the other in the following order from before backward: olfactory or lobes of smell, the cerebral hemispheres, the optic or lobes of vision, and the cerebellum. From the scaly covering of their skin, the sense of touch must be obtuse, and the lips are their only prehensile and principal tactile organs, with the exception of the barbels and other appendages above alluded to. The corneous, slightly movable, and often tooth-armed tongue receives but few nerves, and cannot be the seat of any sense worthy of the name of taste; and moreover, the food does not remain long enough in the mouth for any exercise of this sense. The olfactory apparatus is more complicated, but it is traversed neither by air nor the water used in respiration; the nasal cavities do not communicate with the mouth. The ear, almost always entirely within the cranium, on the sides of the brain, consists essentially of a vestibule and 3 semicircular canals, which receive the vibrations of the integuments and cranial walls; there is rarely any thing that can be called external ear, drum, or tympanic cavity; loud, sudden, and strange sounds frighten fish, as the experience of every fisherman tells him; in ancient, and even in modern times, they have been taught to come and receive food at the tinkle of a bell, or the pronunciation of pet names. The eyes have neither true lids nor lachrymal apparatus; the pupil is large and permanently open, the lens is spherical, and the flat cornea is covered by the skin. Fish are very voracious, most of them living on animal food, and swallowing indiscriminately any thing of this kind which comes in their way; some genera, like the lamprey eels, live upon the juices of other fish, and the mouth is provided with circular cartilages, fleshy disks, teeth, and a piston-like tongue, which enable them to adhere to any surface. The intestinal canal is short and simple, and digestion is rapidly performed, and their increase in size is remarkably affected by the nature and abundance of their food; their limit as to size and the natural duration of life are very little known in the great majority of species.—The blood of fishes is red, and the globules are elliptical and of considerable size. The heart is placed under the throat in a cavity separated from the abdomen by a kind of diaphragm, protected by the pharyngeal bones above, the branchial arches on the sides, and generally by the scapular arch behind; it consists of a venous sinus, auricle, ventricle, and bulb; all these cavities circulate venous blood, and therefore physiologically correspond to the right side of the mammalian heart, though Owen says that the heart of fishes with the muscular branchial artery is the true homologue of the left auricle, ventricle, and aorta of higher vertebrates, tracing the complication of the organ synthetically; the auricle and ventricle, however, are alone proper to the heart itself, the sinus being the termination of the venous system, and the bulb an addition to the pulmonary artery; these 4 compartments, therefore, are not like the 4 divisions of the human heart, but succeed each other in a linear series. The circulation is double, that of the system at large and that of the branchiæ being complete and distinct, and there is also an abdominal circulation terminating at the liver; the peculiar character is that the branchial circulation alone is provided with a propelling cavity or heart, the branchial veins changing into arteries without any intermediate left auricle and ventricle. The venous sinus receives the blood from the general system, after the manner of venæ cavæ; it is not usually situated within the pericardium. The auricle, when distended, is larger in proportion to the ventricle than in the higher vertebrates; its walls are membranous, with thin muscular fasciculi, and its simple cavity communicates with the ventricle by a single opening guarded by free semilunar valves, 2 to 4 in number. The ventricle, usually a 4-sided pyramid, is very muscular, and its fibres are redder than those of any other part of the system; its cavity is simple, the auricular valve generally free and without chordæ tendineæ, and its opening into the bulb provided with 2 or 4 semilunar valves. The contractile *bulbus arteriosus* is provided in the ganoids and plagiostomes with several rows of valves, and its muscular walls are distinct from those of the ventricle. The immediate force of the heart's action is applied through the continuation of the bulb into the branchial artery, which is generally short, and is divided into lateral branches going to the gills; the blood, which has become arterialized by its subjection to the air contained in the respired water, is carried along the returning vessels into the branchial veins, the analogues of the pulmonary veins of man; the 4 on each side form the aortic circle from which the pure blood is sent over the system through the carotids and the aorta and its branches; the blood of the chylopoietic viscera passes through

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the liver before entering the great sinus. Though all the blood passes through the branchial apparatus, it traverses the heart but once. —Respiration is effected by means of the innumerable vascular lamellæ and tufts attached to the external edge of the branchial arches; these are generally 4 on each side, each composed of 2 rows of fringes; in most cartilaginous fishes there are 5, and in the lamprey 7; in the last fish there is a canal from the mouth to the respiratory cavity, resembling a trachea. Fish consume but a small amount of oxygen, but some, not content with that contained in the water, come to the surface occasionally to swallow air; they perish soon out of water in proportion to the quickness with which the gills become dry, asphyxia being produced not by the want of oxygen directly, but because the blood cannot circulate in them properly unless sustained and kept soft by water. Though fish produce little heat, some possess the singular faculty of generating and discharging electricity, as has been described in the articles Eel, and Electric Fishes.—Fish reproduce by means of eggs, the number of which in some species amounts to hundreds of thousands; these have generally only a mucilaginous envelope, and are fecundated after being laid; a few enjoy sexual congress, and are ovoviviparous and viviparous, but the young are almost always left to themselves as soon as born. It is owing to the simultaneous development of great numbers of eggs deposited in the same locality, and to the instinct possessed by some species to keep in company, that fish occur in what are called banks and schools; these schools, composed of individuals kept together only by similarity of food and habits, and in which each one looks out for himself without regard to the wants of the rest, make long migrations from the sea to the rivers and back again, and from one favorite locality to another. At the time of laying the eggs, the migrating species generally approach the shores, and ascend rivers, often coming thousands of miles; year after year, at the same season, the fish appear in immense numbers. The migrations of the herrings, salmon, shad, smelt, mackerel, &c., afford well-known instances of these phenomena. All fishes are of distinct sex. The testes vary much in form in the osseous fishes, and are remarkable for their enormous development in the breeding season, when they are called milt or soft roe. The ovaries in most osseous fishes are 2 elongated sacs, closed anteriorly, and produced posteriorly into short, straight, and wide oviducts, which coalesce before reaching the cloaca; the greatly developed ova are called the roe. There are several interesting points in connection with the development of fishes, which will be better introduced here than in special articles. In most fishes it has been already stated that the exclusion of the ova or roe precedes fecundation, and that in a few (the sharks and rays especially) the ova are fecundated before exclusion; when the embryonic membranes contract no adhesion to the uterine walls, the fish is called ovoviviparous, and in such the embryo escapes from the egg before it quits the parent, while in the ovipara the ovum is expelled while the embryo is contained in it; when adhesion takes place by vascular interlacements, the species is said to be viviparous; the great difference between viviparous fishes and mammals is, that in the former the rupture of the membranes takes place long before birth, while in the latter this occurs at the moment of exclusion. The sudden and great increase of the milt and roe is not compatible with a firm bony cavity such as would be formed by ribs and sternum; this explains the physiological reason for their free or floating ribs. At the approach of the breeding season the colors become brilliant, as is familiarly seen in the bright red throat of the male stickleback; the female seeks to deposit her eggs in shoal water, where the heat and light of the sun may bring them to maturity, and the male follows close to diffuse the fecundating milt over them. It is well known that some fishes deposit their eggs in species of nests, as the stickleback, bream (*pomotis*), and lamprey; Aristotle mentions a fish of the Mediterranean, a species of *gobius*, as making a nest of sea weeds and depositing the spawn in it, the male keeping guard over the female and her young; the hassars, siluroid fishes of Demerara (*callichthys*), make nests of grass and leaves, and both sexes guard the eggs and young; the toad fish (*batrachus*) has been observed on the south shore of Long island lying concealed in deep holes protecting its young, which attach themselves to stones by means of the yolk sac. Another kind of incubation is found in the pipe fish (*syngnathus*), in which the ova are transferred from the female to a kind of marsupial pouch under the tail of the male, being fecundated during this process, and the cavity closing over them; when the young are hatched they follow the male, and return into the pouch at the approach of danger; the male *hippocampus* has a similar sub-abdominal marsupial pouch. In some species of bagré, a siluroid fish from the rivers of Surinam, the females carry their eggs in the mouth, showing the young in various stages of development even to the fish recently hatched; eggs of 2 distinct species have been found in the mouth of a single individual. In the aspredos, or *trompettis*, the eggs are attached by pedicles surmounted by cups to the under side of the abdomen as far forward as the mouth, on the sides to the pectoral and ventral fins, and as far as the middle of the tail; after the eggs are hatched the pedicles are absorbed. Viviparous fishes may be divided into 2 groups: the first includes those in which the gestation is almost wholly ovarian, as in *embiotoca*, *anableps*, *blennius*, &c.; the second those in which the egg enters the oviduct before the development of the embryo begins, as in the plagiostomes. Prof. J. Wyman ("Proceedings of the Boston Society of Natural History," vols. v. and vi.) has described the development of *anableps Gronovii*,

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in which he found the ovarian eggs free in a distinct closed sac, as the mammalian ovum is in the Graafian vesicle; the embryos varied in length from ⅛ to 2¼ inches; in the former the yolk bag was attached, in the latter it had disappeared, and the fœtuses had escaped into the oviduct; here the gestation is carried on nearly to its completion in the ovisac, which becomes vascular, and by its apposition with the papillæ of the yolk sac carries on the functions of respiration and nutrition; though the most recent researches go to prove that the fecundating fluid comes in direct contact with the ovum, and perhaps enters its substance, the surrounding membrane in *anableps* would tend to prevent any such entrance. In the *embiotocoids* of California the mode of development is similar; in *E. lineata* Mr. Girard found young 3 inches long and 1 inch deep; in another genus of the group (*holconotus*) he detected as many as 16 young about an inch long, which had evidently recently escaped from the egg shell; the ovarian gestation here is somewhat different from that in *anableps*, as the young ova are seen between the dividing membranes of the ovary while the fœtuses are in course of development in the general cavity of the organ; it is not determined whether their ova leave the ovisac before or after impregnation. Many species of *gadidæ*, as the cod, haddock, whiting, and American hake, have been found to have a viviparous reproduction, the embryos being developed within the ovary, thus confirming the supposition of many intelligent fishermen. In the blenny (*zoarces anguillaris*) the ovarian bag of the mature eggs has been found to be a double sac, having, however, a disk of considerable size uncovered at the upper part, where the spermatozoa may come in contact with the yolk membrane; this condition has been also found in skates and tortoises, and probably exists in all vertebrates. Internal impregnation is very general in the plagiostomes, and, as this is more certain than the indiscriminate spawning of common fishes, the eggs are much fewer in number and of larger size, as in birds; the egg in its passage through the oviduct receives a dense corneous covering, so that the cases resemble oblong flattened pillows, often with long tendrils at the corners, in which the embryo is snugly coiled up; they become attached to objects floating near the surface, and are there developed by the influence of solar light and heat; from the researches of Prof. J. Wyman it appears that in the skates the eggs are fecundated in the ovary, and that the egg case is formed in advance to receive it as it descends. From these and other structural peculiarities Prof. Agassiz has separated the chimæræ, sharks, and rays from fishes proper, and elevated them into a class, the selachians. Many facts go to show that fishes undergo a kind of metamorphosis as well as insects. August Müller has proved that the 2 genera hitherto considered characteristic of the cyclostome fishes are really different stages of the same animal; he has raised *ammocetes* from the egg of *petromyzon*, and watched the change of the former into the latter genus.—The usual mode of impregnation in osseous fishes, so analogous to the manner in which the fertilizing pollen is brought in contact with the stigmata of flowers, naturally suggested the idea of artificial impregnation; and this has been successfully practised in Europe both by naturalists for purposes of the study of embryology, and by fish breeders on a large scale as a profitable branch of industry. The operation for obtaining the ova and milt consists simply in pressing the body of the fish from the head toward the tail, and in collecting the excluded particles in a common vessel; the contents are occasionally put in motion in order to prevent the growth of parasites upon the eggs, which are very sure to destroy them; a low temperature and even desiccation is not necessarily fatal, so that many kinds in a nearly mature state may be transported for considerable distances; it has been estimated that a million of trout may be raised in this way at a cost of less than $200. The disappearance of salmon from many localities, and the scarcity of trout, both of which are in demand at high prices, should lead pisciculturists to propagate artificially these and other valuable fish; it has been practised extensively in France and Scotland, and the shad and alewife have been experimentally raised in the United States on a small scale. Fish readily adapt themselves to new localities, both marine and fresh-water species; pickerel were easily introduced into the ponds of Berkshire co., Mass., and the great pike of the northern lakes has been transplanted to the Connecticut; the salt-water smelt lives in Jamaica and other ponds in Massachusetts; and the tautog has found a new home in Massachusetts bay, north of Cape Cod. The expense is trifling, the knowledge required small, and the labor slight, of raising and introducing new species of fish; but the advantages in a pecuniary and sanitary point of view are very great. It is to be hoped that, with the prevailing high prices of meat, legislatnres and individuals will soon see the importance of giving special attention to this new industrial pursuit, and place pisciculture by the side of agriculture and horticulture as an element of national prosperity. To say nothing of foreign fish, such as the turbot and the sole, which might be advantageously introduced, there are many native species of great value which are not appreciated here; fish highly prized in Europe are not thought edible in New England; even our despised skates would be considered worth attention in the old world. Massachusetts is annually a loser by many thousands of dollars through unfounded prejudices against such fish as the pollock and whiting; it is only within a few years that the blue fish, long considered a delicacy in New York, has been offered for sale in the Boston market; in like manner, the pollock, which along the shore of Connecticut sells for 5 or 6 cents a pound, in Massachusetts

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is considered fit only for manuring land or for grinding up into mackerel bait. In various parts of the Union similar prejudices deprive the people of abundant and wholesome articles of food.—In most fishes the young when hatched are left to shift for themselves, and of course the greater number are devoured by larger fish, aquatic birds, and reptiles; many species devour each other; small mackerel are often found in the stomachs of larger individuals, when they are abundant; so that with all their fecundity the class of fishes does not multiply beyond the limits set by nature. Though fish are cold-blooded, and the watery element is less affected by sudden changes of temperature than the air, there are external circumstances which limit their distribution both in depth and extent of surface. The difference in density and chemical constitution of salt and fresh water draws the line between the marine and the fluviatile faunæ; below a certain depth, probably not far from 120 fathoms, the absence of light and the increase of pressure would prove an insurmountable barrier to most of the class. Though fish are able to resist extreme cold, and to regain vitality after having been apparently frozen, the average of cold has an important influence on their geographical distribution; the average temperature of the water for the year has been usually taken as the regulator of this distribution, but Dana has shown that the line of temperature established by the average of the 30 coldest days in the year gives the clue to the limits of the marine faunæ. A few arctic species are the same in America and Europe, migrating southward from the same northern centre; but below this region the marine fauna of America is essentially tropical, and that of Europe essentially temperate. In the Atlantic the zones of temperature are remarkably modified by the arctic, Gulf stream, and African currents; on the American side the temperate zone extends only from Cape Cod to Cape Hatteras, about 10 degrees of latitude, while on the eastern it extends from the Swedish coast to the Cape Verd islands, nearly 5 times as many degrees; while the tropical zone, which in America extends from Cape Hatteras to 25° S., or 60 degrees, on the other side embraces only about 20 degrees on the African Guinea coast. As a few instances of local distribution, in contradistinction to the cosmopolitan scomberoids and cyprinoids, may be mentioned the American cottoids and goniodonts, the Mediterranean sparoids, the tropical sciænoids, *squammipennæ*, and mullets; the *pleuronectidæ* of the temperate regions; the tropical fresh-water *characini* of America and Africa; the true salmons of arctic and cold regions; and the marine labroids, and fresh-water chromids. Estimating the number of vertebrates at 20,000, the number of living species of fish may be set down at 10,000, of which more than 6,000 are described.—Of all the vertebrata, fishes are by far the most numerous and widely distributed in the earth's strata; their remains are found from the silurian to the tertiary formations, and are of great aid in determining the changes of the surface of our planet during successive and long geological periods. The first great geological division, the primary age, comprises the lower and upper silurian and the devonian; during this there were no air-breathing animals, and fishes were the lords of creation; it has, therefore, been very properly called the "reign of fishes." Prof. Agassiz, in his *Recherches sur les poissons fossiles* (1833-'43), laid the foundation of fossil ichthyology; 1,000 species are described in the most complete and scientific manner, with superb illustrations. He divides fossil fishes, as he afterward did the recent ones, into 4 orders, according to the form and structure of their scales; these orders, ganoids, placoids, ctenoids, and cycloids, have been sufficiently described in the article COMPARATIVE ANATOMY (vol. v. p. 568). Three fourths of all known fossil fishes belong to the ctenoids and cycloids, which occur in all formations from the chalk upward; the remaining fourth belong chiefly to the ganoids (with enamelled scales like the garpike and sturgeon) and the placoids (like sharks and rays), and extend through all the fossiliferous strata, but are most numerous in the coal, Jurassic, chalk, and tertiary formations; no fish with ctenoid scales (like the perch) or cycloid (like the cod) is found below the chalk. The forms of the earlier fishes were many of them very strange; the pectorals were small and always in advance of the ventrals; above the chalk, the ventrals begin to approach nearer the head; they were not so fully developed as our fishes, but seem to have been, like the sturgeon, arrested in their development. During this epoch the sea covered the whole surface of the globe, and all animals whose remains have been preserved were without exception aquatic, breathing by gills; the climate must have been uniform; the dry land had not appeared above the waters, and all creation was as silent as in mid ocean.—For the systematic classification of fishes, and the history of the science, see ICHTHYOLOGY.

FISHKILL, a township of Dutchess co., N. Y., opposite Newburg, on the Hudson river, and intersected by the Hudson River railroad; pop. in 1825, 8,764. It has a village of the same name situated about 5 m. from the Hudson on a small stream called Fishkill creek, and containing 4 or 5 churches, an academy, 2 newspaper offices, and a bank.—FISHKILL LANDING is situated on the Hudson river, at the mouth of Fishkill creek, and on the line of the Hudson River railroad; pop. in 1855, 1,100. It contains several churches, 10 or 12 stores, an iron foundery, a machine shop, and a few factories. A ferry connects it with Newburg.

FISK, PLINY, an American missionary, born in Shelburne, Mass., June 24, 1792, died in Beyroot, Syria, Oct. 23, 1825. He was graduated at Middlebury college in 1814, studied theology at Andover, and sailed as a missionary for Palestine, Nov. 3, 1819. On reaching Smyrna he

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engaged in the study of the eastern languages, and soon went to Scio to study modern Greek; but as that island was desolated by the Turks in 1821, he went to Egypt, and thence across the desert to Judæa, visiting various places, perfecting himself in his studies, and preaching, till the time of his death. When overtaken by his last illness he was just completing an English and Arabic dictionary.

FISK, Wilbur, D.D., an American clergyman and educator, born in Brattleborough, Vt., Aug. 31, 1792, died Feb. 22, 1839. He passed his early youth in desultory reading, and it was not until he was in his 17th year that the advantages of a school were opened to him. In 1809 he went to a grammar school at Peacham, where he made rapid progress in his studies, and in 1812 he entered the sophomore class in the university of Vermont, at Burlington. The war with England interrupting the exercises of the institution, and finally resulting in the occupancy of the college building by the U. S. troops, he entered Brown university at Providence, R. I., where he was graduated in 1815. Soon afterward he entered the office of the Hon. Isaac Fletcher of Lyndon, and commenced the study of law, which, however, he did not long pursue. It being necessary for him in consequence of the expense which his collegiate course had involved to seek at once some profitable employment, on the recommendation of the president of Brown university he became a private tutor in the family of Col. Ridgely, near Baltimore, Md. While thus engaged he resolved upon entering the ministry of the Methodist Episcopal church. His first appointment was Craftsbury circuit, where he labored 2 years. In 1819 he was appointed to Charlestown, Mass. His labors in this field were too great for his feeble constitution, and he sunk under them during the second year, and was placed on the superannuated list. In 1824 he was a delegate to the general conference, and was chosen to write the address to the British conference. At the ensuing session of the annual conference he was recognized as the principal of the Wesleyan academy at Wilbraham, an institution which had already under his auspices risen to considerable eminence. He was a delegate to the general conference of 1828, and was by that body elected bishop of the Canada conference, which he declined. In 1829 he received the degree of D.D., and was elected president of Lagrange college, and also professor in the university of Alabama. These with other and more lucrative offices were tendered him, but such was his desire to advance the cause of education in the Methodist church, particularly in New England, that he declined them all and continued at his post until 1830, when he was elected president of the Wesleyan university at Middletown, Conn., which under his charge became exceedingly popular. At the general conference of 1832 his appeals in behalf of Indian missions resulted in the organization of the Oregon mission. But his labors had now seriously impaired his health, and he consequently made a voyage to Europe in 1835–'6, and embodied the result of his observations in a volume of "Travels in Europe." During his absence the general conference elected him to the office of bishop of the Methodist Episcopal church, which after deliberation he declined.

FISTULA, an ulcer in the form of a narrow canal, more or less deep and sinuous, lined by a pale false mucous membrane, indolent and indisposed to heal, kept up by some local pathological condition of the soft parts or bones, or by the presence of some foreign irritating body, and leading or not to a suppurating cavity. There may be a single external or internal opening, or there may be a communication between the skin and the mucous, serous, or synovial cavity. Some writers restrict the term fistula to such of the above lesions as take their origin from some natural cavity or excretory duct, while those communicating with abscesses and caused by foreign bodies or disease of the bones are called fistulous ulcers or sinuses; but the distinction is of little importance, as the pathological conditions and the principles of treatment are the same. Fistulæ arise when abscesses are not thoroughly healed from the bottom, when any irritating substance (as a ligature or a piece of dead bone) remains in the tissues, or after wounds of excretory ducts. If superficial and of recent origin, fistulæ may heal of themselves; but if deep-seated or chronic, they generally require surgical interference. They are usually rather tedious and annoying than dangerous; but when large, deep, with several openings and profuse discharge, they may produce hectic fever and fatal exhaustion. The principles of treatment are, to remove any irritating cause, as a piece of dead bone or foreign body; to prevent the accumulation of matter, by counter openings, if necessary, and by properly directed compression; and to excite adhesive inflammation by pressure, stimulating injections and applications, setons, caustic, and, as a last resort, incision of the fistula, that the soft parts may have an opportunity of healing from the very bottom of the wound; the constitution should also be strengthened by nourishing diet and tonic medicines. The most common varieties are the anal, lachrymal, salivary, and urinary fistulæ.—Anal fistula is situated by the side of the *sphincter ani* muscle, and is difficult to heal both on account of the constant muscular contractions and the passage of fæcal matter into it. There may be an opening into the bowel internally and externally, either or both; according to Brodie, this affection always begins by an ulceration on the side of the rectum into which the fæcal matter escapes, causing abscess and consequent fistula; but in some cases there is no opening into the bowel, the sinus reaching only to its outer coat; this affection is frequently a painful complication of consumption. The simple and efficient remedy for this fistula is division of the walls from the internal opening

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to the skin, so as to prevent muscular contractions; after this operation the introduction of lint allows the wound to heal by granulation from the bottom. This affection is considerably more common in males than in females.—Lachrymal fistula is situated at the inner corner of the eye, and communicates with the lachrymal sac; it begins by an obstruction of the nasal duct, followed by inflammation, abscess, and fistulous opening. Beside the usual remedies for acute and chronic inflammation, the obstructed duct may be restored by the introduction of a metallic or elastic style. In a similar manner the duct of Steno may be obstructed, so that the saliva dribbles out on the cheek instead of passing into the mouth; the remedy is to establish the passage from the fistula to the mouth by puncture and the introduction of silk or flexible wire, and then paring and uniting the edges of the external opening.—In urinary fistula there is an opening from the perineum into the urethra, through which the urine dribbles wholly or in part; it is generally caused by urinary abscess and extravasation into the soft parts. For its relief all strictures should be dilated, the urethra brought to a healthy condition, and the fistula stimulated to contract and granulate by external applications. Sometimes there is a communication between the urethra and the rectum. But the most disgusting and difficult to remedy are the vesico-vaginal and recto-vaginal fistulæ, in the former of which the bladder, and in the latter the rectum communicates with the vagina; both of these affections are the consequences of the laceration and sloughing after tedious labor; the most successful method of treatment is by paring the edges of the fistula and uniting them by sutures, but this succeeds only under the most favorable circumstances; the unfortunates thus affected are generally invalids for life. A fistula may communicate with any of the abdominal viscera, or with any part of the body, on the surface or deep-seated, which may be diseased from abscess, dead bone, or the presence of a foreign substance.

FITCH, Ebenezer, D.D., an American clergyman, the first president of Williams college, born in Norwich, Conn., Sept. 26, 1756, died in West Bloomfield, N. Y., March 21, 1833. He was graduated at Yale college in 1777, where in 1780 he was appointed tutor, and continued to act as such for several years. In 1790 he was chosen preceptor of the academy in Williamstown, Mass., and when in 1793 it grew into and was incorporated as Williams college, he was elected its first president, which office he filled with ability and success till 1815, when, resigning, he was chosen pastor of the Presbyterian church in West Bloomfield, N. Y. This charge he held till 1827, and after his resignation continued to preach occasionally almost till his death.

FITCH, John, an American inventor, and the pioneer in steam navigation, born in Windsor, Conn., Jan. 21, 1743, died in Bardstown, Ky., in June or July, 1798. He worked on his father's farm, with slight opportunities for education and under very unhappy influences, till the age of 17 years, when he was employed for some time on coasting vessels, and then became apprentice to a clock maker. His master so utterly neglected his instruction in the art that he was unable to pursue it, and on reaching manhood he commenced business as a brass founder in a small way, failed in an attempt to manufacture potash, married unhappily, separated from his wife and two children (toward the latter of whom he cherished the strongest affection, and in after life made persistent but ineffectual efforts for a reconciliation with them), and settled in New Jersey as a button maker and silversmith. When the revolutionary war broke out, he was elected a lieutenant in the New Jersey line, but on meeting with some real or supposed injustice he left the service, and was employed by New Jersey as armorer of the troops. Driven away by the invading army, he engaged in his trade of silversmith in Bucks co., Penn., till the approach of the enemy again made it necessary for him to shift his quarters. He next supplied the American troops at Valley Forge with tobacco, beer, and other articles, in which he drove a prosperous business, resulting in a considerable accumulation of depreciated continental money. With this he purchased Virginia land warrants and removed to Kentucky, where he was appointed deputy surveyor; was captured by the Indians, and was marched through the wilderness to the British post at Detroit. He was detained some time as a prisoner, but was at length exchanged, and finding his way again to Bucks co., formed a company for the survey and purchase of lands in Kentucky and Ohio. On his return from these surveys, by which he acquired several hundred acres of land, he petitioned congress for an appointment as surveyor, and while awaiting the unsuccessful result of his application prepared a map of the N. W. country. This he engraved on a sheet of copper and printed on a press of his own manufacture. In the month of April, 1785, the idea occurred to him of propelling a carriage along an ordinary road by the force of steam. After a week's study he abandoned it as impracticable, and devoted himself to the application of steam to the propulsion of vessels. He immediately sought to interest leading men in Pennsylvania in the project; in August following he addressed a petition to congress in regard to it, and in September presented a drawing of the boat, models, and tube boiler to the American philosophical society. He next petitioned the legislature of Virginia for aid. James Madison presented his memorial, and Patrick Henry, then governor, took an interest in the plan. But the legislature was slow, and Fitch conceived the plan of raising the necessary funds by the sale of his map. He accordingly executed a bond to Gov. Henry in the sum of £350, conditioned that if he should sell 1,000 copies of his map at 6s. 8d., he would in 9 months thereafter exhibit a steamboat in the waters of Virginia. Nothing came

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of it. The assembly of Pennsylvania was next applied to, and encouraged him to the extent of a favorable report of a committee. The assembly of Maryland did the same; but there were no funds in her exchequer. The legislature of New Jersey rejected a proposition to grant £1,000, but gave Fitch an exclusive privilege for 14 years for the use of boats propelled by fire or steam. Disappointed in these efforts, Fitch formed a private company, and in April, 1786, the working model of a steam engine with a one-inch cylinder was the humble commencement of his enterprise. In 3 months' time he moved a skiff on the Delaware by his new contrivance at a speed satisfactory to the associates. In March, 1787, a bill vesting in John Fitch exclusive rights in the steamboat passed the legislatnre of Pennsylvania, and similar laws were enacted in Delaware and in New York. In August of that year a new steamboat was tried on the Delaware, with an engine of 12-inch cylinder. The convention to frame a federal constitution was then sitting in Philadelphia, and most of its members were present at the experiment. Though the boat did not attain sufficient speed to answer the purpose of a packet, the trial proved conclusively the efficiency of steam as a motive power for vessels. To increase this efficiency it was only necessary to enlarge the machinery. Soon after this success the company learned for the first time that James Rumsey of Virginia claimed to be the first inventor of the steamboat, and to have made a prior successful trial. A war of pamphlets followed. An examination of the evidence leaves no reason to doubt that the first practical success in steam navigation was made by John Fitch. It is probable enough that Rumsey had entertained the idea of propelling a boat by steam before it occurred to Fitch. It had previously occurred to others In 1788 Fitch built a second boat for the old machinery, which made several passages between Philadelphia and Burlington at the rate of 4 miles an hour. More power was requisite for commercial success. A boat built for an engine of 18-inch cylinder was ready for trial in Aug. 1789. After several failures and changes in the machinery, this boat was successfully tried in the spring of 1790, and was run as a passenger boat on the Delaware, making during the season more than 2,000 miles at an average speed of 7½ miles an hour. But more money was wanted to introduce the invention, and the numerous stockholders in the enterprise could not be brought to respond to further assessments. The faith and enthusiasm of the inventor must be shared by the capitalist who undertakes the execution of his scheme; and faith and enthusiasm are not to be predicated of a joint stock association. Time ran on, and Fitch was cramped for the necessaries of life. He felt and repeatedly asserted that the passenger traffic of the great western rivers would one day be carried on exclusively by steam; that ships of war and packet ships would navigate the Atlantic by steam; and that some one to come after him would reap fame and fortune from his invention. He now sought some small office under the government of Pennsylvania and that of the United States, but was disappointed. Failing to interest new parties in his project, and the company absolutely declining to make further advances, Fitch abandoned his boat, and for some months wandered about the streets of Philadelphia, a ruined man, with the reputation of a crazy projector. On Oct. 4, 1792, he presented a sealed envelope containing manuscripts to the library company of Philadelphia, with a request that it might be kept unopened till 1823. In 1793 he went to France in pursuance of a contract with Aaron Vail, contemplating the European introduction of his invention; but the times were not propitious for such matters, and the means and patience of Fitch were easily exhausted. On his return he remained a while in London on a visit to an old friend, Mr. Leslie, whose daughter, the authoress, retained a very vivid impression of the eccentric projector, and had intended to write his biography. In 1794 he worked his passage to the United States as a common sailor, landed at Boston, and spent nearly 2 years with his friends at East Windsor. In the summer of 1796 he was in New York, and placed a small boat on the Collect, worked by a submerged wheel at the stern, which has been described as a screw propeller. Soon after he visited Oliver Evans in Philadelphia, and expressed his intention of forming a company to introduce steamboats on the western waters. With this view, and to ascertain the condition of his western property, he went to Kentucky, where he found his land overrun with squatters, and no encouragement for his steam projects. Mortified by his inability to carry out his great project, and wearied by the lawsuits in which he had engaged for the recovery of his lands, Fitch became despondent and desperate, and terminated his life by swallowing a dozen opium pills which had been left with him from time to time by his physician to use as anodynes. The sealed envelope was formally opened by the directors of the library company in 1823, and was found to contain a detailed history of his adventures in the steamboat enterprise, which is inscribed: "To my children and to future generations," with a journal and other papers, from which an interesting biography was prepared by Thompson Westcott and published in Philadelphia in 1857. A memoir of Fitch by Mr. C. Whittlesey is also to be found in Sparks's "American Biography."

FITCH, Ralph, one of the earliest English voyagers to India, lived in the latter part of the 16th century. He was a London merchant who dealt in eastern goods, and, excited by the narratives of Drake and other voyagers, persuaded John Newbery and others to join him in an expedition to the East by way of the Mediterranean. The adventurers set sail in Jan. 1583, bearing letters of friendship from Queen Eliza-

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beth to the emperor of China and the Great Mogul Akbar. They landed at Tripoli in Syria, whence they went to Aleppo, and traversing Mesopotamia reached Bagdad. From that city they sailed down the Tigris and through the Persian gulf to Ormus, where they began a profitable traffic. But their success roused the jealousy of other European merchants in those parts, one of whom, an Italian, denounced them as heretics to the Portuguese inquisition. The Englishmen were thrown into prison, dispossessed of their goods, and afterward sent to Goa, where the governor kept them in prison for a month, partly on account of an alleged offence committed at Malacca by Sir F. Drake. They were finally released on professing the Roman Catholic faith, paying a heavy ransom, and giving bond in 2,000 pardaos not to quit the town without leave. Their business prospered, but impatient of continued taxes and seeing reason to apprehend further injustice, they secretly changed their goods for pearls and escaped from Goa, April 5, 1585. They visited Belganm, and went to Bejapoor, of whose idols Fitch says: "Some be like a cow, some like a monkey, some like peacocks, and some like the devil." Thence, after passing through Golconda, they travelled north through the Deccan, and visited successively Burhampoor, the capital of Candeish; Mandoo, once the chief city of Malwah; Agra, where one of the party, William Leader, a jeweller, remained in the service of Akbar; Allahabad, Benares, Patna, Tanda in Bengal, and a country called by Fitch Couche, which appears to be at the foot of the mountains of Bootan. They travelled S. to Hoogly and through Orissa, passing by a port called Angeli, which they described as the seat of a great trade. It cannot now be identified. Returning to the Ganges, they saw Serampore and other towns on its lower branches, made an excursion into Tipperah, and took passage in a vessel to Negrais, in Pegu. They visited Malacca, went back to Bengal, shipped for Ceylon, and thence doubling Cape Comorin sailed to Cochin and Goa, and returned to England in 1591, by the same route they had come, after having performed the most extensive journey that had yet been made by any Europeans in India. Fitch's narrative of his travels, which may be found in Hakluyt and in Purchas's "Pilgrims," is exceedingly interesting not less for its quaint style than for the mass of information which it contains.

FITCHBURG, a township of Worcester co., Mass., on a branch of Nashua river, 50 m. N. W. from Boston; pop. in 1855, 6,486. It is a terminus of 3 railroads: the Fitchburg, to Boston; the Fitchburg and Worcester, to Worcester; and the Vermont and Massachusetts, to Brattleborough. It is furnished with abundant water power, and is a flourishing manufacturing place, the principal branches of industry being the making of cotton goods and paper. In 1855 it contained 8 paper mills, with $137,500 capital, employing 121 hands, and producing $287,533 worth of paper yearly; 4 cotton mills, with $151,000 capital, employing 202 hands, and producing $252,025 worth of goods; 1 woollen mill, with $50,000 capital, employing 50 hands, and producing $75,000 worth of cassimere; and 5 factories of machinery and boilers, with $63,500 capital, employing 149 hands, and producing $125,400 worth of machinery, &c. The town has numerous other factories of various sorts, and in 1858 contained 8 churches (1 Baptist, 4 Congregational, 1 Methodist, 1 Roman Catholic, and 1 Universalist), 2 banks, 1 savings bank, 2 newspaper offices, an athenæum, and a high school. The town house is a handsome building 100 feet long and 65 feet wide. The principal village is lighted with gas.

FITZ (old form of Fr. *fils*, son), prefixed to proper names, corresponds to the Celtic *Mac*, the Irish *O'*, the Hebrew *Ben*, and the Aramaic *Bar*, and indicates descent (usually illegitimate) from the ancestral name following it. Thus the Fitz-Clarences were the children of the late duke of Clarence (afterward William IV.) by the actress Mrs. Jordan.

FITZGERALD, Edward, lord, an Irish soldier and politician, 5th son of the first duke of Leinster, born near Dublin, Oct. 15, 1763, died June 4, 1798. Evincing an early predilection for military affairs, he entered the army, and distinguished himself for intrepidity as aide-de-camp to Lord Rawdon, in the latter part of the American revolutionary war, and was severely wounded in the battle of Eutaw Springs. After sitting for some time in the Irish house of commons, and travelling on the continent, he rejoined his regiment in Canada, where he befriended the celebrated William Cobbett, a sergeant-major under him, by procuring his discharge. Returning in 1790, he was again elected to parliament, and in 1792 visited Paris, where he became associated with some of the leading revolutionists. At a banquet given by Englishmen in Paris, he publicly renounced his nobility, and proposed a toast to the success of the republican arms, and was consequently dismissed from the British army. He then returned to Dublin, joined the society of united Irishmen, encouraged other political and military organizations, defending them in the Irish parliament, and negotiated with the French directory, till a warrant was issued by government for his apprehension. He refused to abandon his associates by escaping, but secretly directed the revolutionists from a place of concealment in Dublin, after the other principal leaders had been arrested, and was at length discovered and captured after a desperate struggle. He was severely wounded, and died in prison. His biography was written by Thomas Moore (London, 1831).—Pamela, lady, wife of the preceding, reputed daughter of Mme. de Genlis and Philippe duke of Orleans (Egalité), died in Paris in Nov. 1831. She was educated with the children of the duke of Orleans, being reported an English orphan. She was married to Lord Fitzgerald at Tournay in 1790, and after his death was again married to Mr. Pitcairn, Amer-

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ican consul at Hamburg. A separation ensued, and she resumed the name of Fitzgerald, and lived in retirement at Montauban till 1830, when, the associate of her childhood being called to the throne of France, she went to Paris. But Louis Philippe refused to receive her, and she died in indigence.

FITZHERBERT, Sir Anthony, a learned lawyer of the reign of Henry VIII., born in Norbury, Derbyshire, died in 1538. After a distinguished career at the bar, he was appointed in 1523 a justice of the court of common pleas. He had the courage to oppose the alienation of church lands by Cardinal Wolsey, when that ecclesiastic was at the height of his power. He was the author of the "Grand Abridgment of the Law" (1514), and was the first English writer on practical agriculture. His "New Treatyse for all Husbandmen" (4to., London, 1523) has passed through more than 20 editions.—Thomas, a learned English Jesuit, grandson of the preceding, born in Swinnerton, Staffordshire, in 1552, died in Rome in 1640. After various fruitless attempts to induce the Roman Catholic powers of Europe to aid the Roman Catholics of England, he entered the society of the Jesuits, and for the last 22 years of his life presided over the English college at Rome. He wrote a number of treatises of a religious and controversial character.

FITZHERBERT, Maria, wife of George IV. of England, born in July, 1756, died in Brighton, March 29, 1837. Her father, Waller Smythe of Brambridge, Hampshire, was of an old Catholic family, and she was married successively to Edward Weld of Dorset and Thomas Fitzherbert of Stafford, being left a widow a second time in 1781. In 1785 the prince of Wales, afterward George IV., first saw her, and in December of that year they were privately married by a clergyman of the established church, in the presence of witnesses. The prince found no difficulty a few years later in disregarding this alliance, which, as to its civil effects, was contrary to law; but after his quarrel with Queen Caroline he returned to Mrs. Fitzherbert, who was advised by the Roman see to live with him. His excesses subsequently compelled her to leave him, and she retired to Brighton, where she passed the remainder of her life, much respected by all classes of society.—See "Memoirs of Mrs. Fitzherbert," by the Hon. Charles Langdale (London, 1856).

FITZPATRICK, Benjamin, U. S. senator from Alabama, born in Green co., Ga., June 20, 1802. He was left an orphan when very young, and in 1815 removed with an elder brother to the Mississippi territory. They settled in the valley of the Alabama river, near where the city of Montgomery, Ala., now stands. The educational advantages of that region were then very limited, and Benjamin had to rely mainly upon himself, and by diligent application he acquired a good practical education. He then studied law, and in 1821 obtained license to practise. He was soon afterward elected state's attorney, and held that office until 1829. On account of declining health he then abandoned his profession, and settled on a farm in Autauga co., devoting his time to the improvement of his estate and quiet study until 1840. In that year he served as a democratic candidate for presidential elector for the state at large. In 1841 he was nominated for governor, and after a warm contest was elected by a majority of over 10,000. In 1843 he was reelected without opposition. At the close of his second term, in Nov. 1845, he was complimented by the legislature with a unanimous vote of thanks for the manner in which he had administered the affairs of the state. In Nov. 1848, he received from the governor the appointment of U. S. senator to fill the vacancy occasioned by the death of Dixon H. Lewis. He served during the short session of 1848–'9, and the special executive session of the senate which was called at the beginning of President Taylor's administration. Again, in Jan. 1853, he was appointed senator in the place of William R. King, who had been elected vice-president. At the meeting of the legislature in Nov. 1853, Gov. Fitzpatrick was elected for the remainder of Mr. King's term, which expired March 3, 1855. In November of that year he was reelected for a full term of 6 years. He seldom engages in the debates of the senate. He is a plain, practical working member, a man of cool judgment and agreeable manners. His personal popularity is shown by the uniformity with which he is called to the chair of the senate as president *pro tem.*

FITZROY, Robert, rear admiral in the British navy, second son of Gen. Lord Charles Fitzroy, born in June, 1805. He entered the navy in 1819, and obtained his first commission Sept. 7, 1824. After serving on the Mediterranean and South American stations, he was appointed to the command of one of the vessels which had been sent by the British government to explore and survey the coasts of Patagonia, Chili, and Peru. In 1831 Capt. Fitzroy's vessel was fitted out for another surveying expedition, and sailed from Plymouth in November of that year. Having accomplished, as far as practicable, the objects of the expedition, he returned to England in Oct. 1836. In 1841 he represented the city of Durham in parliament, and in the following year was appointed acting conservator of the river Mersey. In 1843 he became governor and commander-in-chief of the colony of New Zealand, which offices he held for 3 years, when he was superseded by Sir George Grey. He was made rear admiral in 1857. He is the author of several works, the most important of which is a "Narrative of the Surveying Voyages of H. M. S. Adventure and Beagle, between the years 1826 and 1836" (2 vols. 8vo., London, 1839), the 1st vol. being by Capt. King, and the 2d by Fitzroy.

FITZWILLIAM, William Wentworth Fitzwilliam, 4th earl of that name in the peerage of Ireland, and 2d in that of England, an English statesman, born May 30, 1748, died Feb. 8, 1833.

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He opposed the ministry of Lord North in the American war of independence, but did not take office when his uncle, the marquis of Rockingham, formed a new cabinet in 1782. Although a political friend of Fox, he abandoned him upon hearing his eulogies of French revolutionary principles, and took office as president of the council, July 11, 1794, when the duke of Portland became the nominal head of the cabinet. In 1795 he was lord lieutenant of Ireland, in the height of the disturbances which then agitated that portion of the kingdom; but was recalled after a few months, against the decided wishes, it is said, of the Irish people, for having supported a bill presented by Grattan in favor of Catholic emancipation. He was president of the council for a short time in 1806, on the death of Mr. Pitt, but his liberal views kept him out of office during the greater part of his career.

FIUME (Illyrian, *Reka;* Lat. *Fanum Sancti Viti ad Flumen;* Germ. *St. Veit am Flaum*), formerly the capital of the Hungarian Littorale (Adriatic coast), now the capital of a circle (pop 96,800) of the Austrian crownland of Croatia, situated in a valley on the gulf of Quarnero, at the mouth of the Fiumara, 88 m. S. E. of Trieste; pop. 15,000. The old part of the town, on the slope of the hill, is poor looking and gloomy; the new part, which stretches along the coast, is well built, cheerful, and neatly paved. It has a provincial and district court, a chamber of commerce and industry, several schools, gardens, promenades, and many remarkable buildings, including churches, the government house, the city hall, a market hall with colonnades, a nunnery, a hospital, and the casino, which contains concert and ball rooms, and a theatre. In the vicinity is an ancient castle. The harbor admits only small vessels, larger ones anchoring in the gulf at a distance of 3 miles. The products of Fiume consist chiefly of linen, woollens, leather, earthenware, sugar, wax, beer, and rosoglio; its exports, mostly the produce of Hungary, are wheat, wine, tobacco, hemp, timber, rags, &c. The imports and exports comprise about 160,000 tons annually. Its refineries, mills, tanneries, and paper manufactories are extensive, one of the latter producing paper valued at $250,000 annually. The construction of a railroad, to connect Fiume with the lower Danube, was long the favorite plan of Kossuth and other Hungarian patriots, in the years previous to the revolution, and a matter of lively agitation. Fiume became a free port in 1722, and is now one of the principal seaports of Austria. Entrances in 1855, 6,116 Austrian vessels, tonnage 84,642; 557 foreign vessels, tonnage 30,106. Clearances, 6,210 Austrian vessels, tonnage 99,091; 550 foreign vessels, tonnage 30,310.

FIXTURE, a word of frequent use, and in regard to which some little confusion exists, because the exact legal definition is precisely opposed to the meaning commonly given to the word. A fixture, in law, is a personal chattel in some way annexed to the realty, but such, or so annexed, that he who put it there may take it away. We apprehend that the common meaning of the word is, a thing so fixed to the realty that it cannot be taken away. That is, an ornament, or utensil, or addition of any kind, is commonly called a fixture, if so affixed to the land (or to the house) that the owner of the land necessarily owns the thing, and it cannot be removed without his permission. Kent uses the word in both senses, but rather inclines to the common meaning; and for convenience, through this article, we shall mean by fixtures things so fastened to the land (or to a house which is fastened to the land) that they cannot be removed against the will of the owner of the land.—The first remark to be made is, that the whole modern law, which permits a great number of things to be attached to the land and thence removed by the occupier without reference to the will of the owner of the land, is in derogation of the common law. That originally regarded land as almost every thing, and personals as of little value; and it was a nearly invariable rule, that any thing which was once attached or annexed to the land, or made a component part of any thing so annexed, became at once the property of the owner of the land. This is certainly not the law now in England or the United States. It may be said that we have gone further from the ancient rule than have the English, and are more liberal in permitting removals of this kind; but the law is much the same in both countries. Whether a thing was a fixture or not, was formerly made to depend almost entirely upon the intention with which it was put up or annexed; and this was gathered from slight indications. Thus, the same thing was a fixture if nailed on that remained personal property if screwed on, because the use of screws, which can be unscrewed, indicated the intention of removing it. Intention still remains a very important test; but another has come to be of almost equal value, viz., the capability of removal without injury to the premises; or the possibility of taking the thing away and restoring the premises to the same order and condition in which they were before it was annexed.—The earliest relaxations from the ancient rule were made in favor of what are sometimes called trade fixtures; by which is meant all those additions which the tenant of a house or land makes for the purpose of carrying on his trade or business. It cannot now be denied that a very wide power of removal has been allowed to tenants in cases of this kind. To illustrate this by instances: it has been adjudged that a tenant might take away (having put them on the land for purposes of trade or manufacture) furnaces, iron backs to chimneys, grates, pumps, vats, cisterns, coppers, tubs, blinds, verandas, fire engines, steam and gas machinery, or even sheds, shops, and other buildings, and the like, even when these things are built into brick walls or rooms, or set on stone or brick foundations. Indeed, we doubt whether the courts of the United States would now stop short of

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saying that any implements or instruments of trade may be taken away by an outgoing tenant, if he can remove them and restore the premises substantially to their original condition. Not long after the relaxation in favor of trade, it was admitted by the courts that many things might be taken away by an outgoing tenant which he had put up and fastened to the house, either for mere ornament or for domestic convenience. Under this head are now included a great variety of things, such as mirrors, marble slabs and chimney pieces, window blinds, doors, windows, baths, gas pipes and lights, stoves, fire grates, and ranges. It is difficult to draw an exact line here, but it must be said that the law is not so liberal in permitting things of ornament or convenience to be removed, as things of trade; and the rule is more strictly applied, that the premises are not to be disfigured or injured by the removal. There are certain things about which the adjudication is as yet conflicting, such as trees planted out, conservatories, hothouses, and other structures for gardening. Here we should say that a nurseryman who put these things up for trade might certainly remove them, on the same conditions of putting the premises in good order as before. But a mere tenant for occupation, who had put them on the land for his own enjoyment, might be obliged to leave them, although we incline to think that he would be permitted to take them away, leaving, of course, the premises wholly unimpaired by the removal.—The same thing will be a fixture as to some persons, but not as to others. Thus a man who sells a house most certainly sells with it, and therefore cannot take away from the buyer, very many things which an outgoing tenant who put them there might remove when he goes. Here the law, instead of being liberal, professes to be strict; and the seller would be permitted to claim and sever from the land only those things which were evidently as free from all attachment to it as mere articles of furniture. And if he had fastened any things down, so as to give them the appearance of being a part of the house, it might be doubted whether he would be permitted to remove them. The same strict rule would be applied as between the heir who takes the land and the executor or administrator who takes the personals; and so it would be between lessor and lessee or mortgageor and mortgagee. Indeed, it may be said, in general, that in the matter of fixtures the law is extremely liberal as to the right of outgoing tenants to remove things of trade, and nearly as much so as to the same persons in respect to things of convenience or ornament; but very strict as to any disposition made of the land by the owner of it. A building, if placed on blocks or other movable foundations, is in almost no case a fixture, and it may be doubted whether even one who sells the land might not have the right of removal; but this question would probably be determined in each case by its peculiar circumstances.—It is common, and always prudent, to provide in leases for the removal of things which the tenant expects to put up and take away; for although the law is liberal on some points, it is rather strict, and perhaps uncertain, as to others. Thus it is very clear that a tenant has the same rights of removal, and no more, whether he be a tenant at will, or for a short term of years, or a longer. But on one point the law is not certain. The general rule laid down in the books is, that a tenant who has the right of removing any chattels must carry them all away during his term; and if after his lease expires he enters upon the land to remove them, he is a mere trespasser, having no more right there than any other person. This rule would probably be adhered to and applied by our own courts, with perhaps two exceptions. One might be, where the tenant was prevented by unavoidable hindrances, or by great obstructions, from removing the chattels during his lease, and his delay could not therefore be attributed to his default. If the court could not on this ground give him a legal right to enter on the lands (and we doubt whether they could), they might at least make the damages recoverable from him as trespasser only nominal. The other exception is where a tenant has his lease determined by the will of the landlord, or some other event, unexpectedly. We should say, as matter of law, that an outgoing tenant was entitled to sufficient notice to exercise all his rights with reasonable convenience; and among them, that of removing whatever he had a right to take down and carry with him.

FLACIUS, Matthias, surnamed Illyricus, a German Protestant theologian, born in Albona, Istria, in 1520, died in Frankfort-on-the-Main in 1575. He was induced to abandon his first purpose of entering a convent, and to visit the German universities. At Wittenberg he heard Luther and Melanchthon, adopted their opinions, and was appointed professor of Hebrew. After the death of Luther he resisted with great energy the formulary known as the *Interim*, opposed the conciliatory measures of Melanchthon, and established himself at Magdeburg at the head of a party of rigid Lutherans. In 1557 he was appointed professor of theology in the newly founded university of Jena, and engaged in a violent dispute with Strigel concerning hereditary sin and the synergetic power of the human will, which resulted in his being deposed. He retired to Ratisbon, and afterward preached in several German cities. He was one of the most prominent of the reformers, and beside producing numerous polemical writings, distinguished for their severity, was the originator and one of the principal authors of the famous "Centuries of Magdeburg."

FLAG, the common name of a large family of the lowest order of plants, known as *algæ*. These algæ have all flagging habits, like the common sea weeds, which are usually fixed to rocks by their roots, and their branches are borne up by the tides, falling again and lying in confused

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masses one upon another at its recess. The propriety of this homely term is better seen in the ulva or laver, of which *ulva latissima*, very common on the American coast, having a broad, ovate or oblong, undulated, bright green frond, may be seen lying on the soft ooze at low tide, and floating near the bottom at high water. *Enteromorpha*, with tubular, membranaceous, green, netted fronds, is still more flaccid, and is easily collected from rocks and beaches, when thrown up by the winds. A rich, dark purple kind (*porphyra vulgaris*, Agardh) may be frequently noticed on the piles and posts of wharves, hanging loosely down, like broad shreds, growing also on rocks between high and low water mark. Even in fresh water, in running streams, the flags are to be met with, such as *batrachospermum moniliforme* (Roth.), with very delicate, branching filaments, composed of violet-colored beads, and having a plumy, flagging aspect. So the *conferva*, resembling confused and tangled skeins of silk, have the same appearance; and even in the more highly developed bright crimson and red kinds, or in the fuscous and inelegant *fuci*, and in the larger forms, equalling in size trees and shrubs, the name of flags is not an inapt one. Beside these lower plants, the name of flag is given to the iris family, which bear conspicuous flowers, some of great splendor. (See IRIS.) The sword flags are stiff, erect, very long-leaved plants, with spikes of extremely showy purple, scarlet, rosy, or white blossoms, and with large flat tubers (*cormi*), requiring heat, moisture, and sunshine while growing, but entire rest and dryness when dormant. Natives of the Cape of Good Hope, few garden flowers exceed them in gorgeousness or beauty, and few require so little care. The Belgian florists have succeeded in raising many splendid hybrids and varieties, of every hue; and the flower catalogues afford the names of the choicest of these, which command high prices. *Gladiolus communis* is hardy enough to survive our winters; it is a slender-growing species, with pretty purplish or crimson blossoms, and this and one or two others found in the south of Europe are exceptional; the rest are natives of the hot regions, particularly of the Cape. The ixias are smaller, dwarf irids or flags, with open, showy blossoms upon spikes, and variously colored. They are finely suited for winter flowering in greenhouses; their bulbs or *cormi* are planted early in the autumn; the plants, on rising from the soil, are exposed to the air and light, and on approach of frost placed just beneath the sashes of the roof, where they blossom toward spring. These also require extremes of treatment, being kept perfectly dry and warm when in a state of repose.

FLAGELLANTS, also called whippers (*verberantes*), brethren of the cross (*crucifratres*), cross-bearers (*cruciferi*), penitents who, in the 13th, 14th, and 15th centuries, went about in procession day and night, naked to the waist, with heads covered, singing penitential psalms, and whipping themselves until the blood flowed. They were incited to these practices partly by the wars of the Guelphs and Ghibellines, which the people hoped to arrest by extraordinary penances, partly by the zeal of monks and clergymen who recommended in the confessional and in their sermons self-flagellation as a means of appeasing the wrath of God. They took their rise at Perugia in 1260. At first the pope placed no obstacles in their way, because they belonged to the party of the Guelphs, and by giving alms, reconciling themselves with their enemies, and other works of charity, seemed to exercise a salutary influence. But soon both the ecclesiastical and the secular authorities declared themselves against the large procession of flagellants (*Geisslerfahrt*) which in 1261 visited Austria, Poland, and Hungary, the members of which whipped themselves for 33 days, in commemoration of the number of years which Christ lived upon earth. The measures taken against them caused their disappearance in the same year. The flagellants were most numerous in the 14th century, especially after 1349, when the "black death" had swept over Europe, and had carried off in Germany alone 1,200,000 persons. When the first procession made its appearance in Magdeburg, during the week after Easter in that year, they spread with amazing rapidity over all Germany, and even to England and Denmark. Women were found in the processions; and in one case even 200 boys, about 12 years old, went about as flagellants. At first the sympathy with these processions was general and enthusiastic. Thousands of people were present and shed tears at the bloody ceremonies. At Spires they were entertained at the public expense, and the coronation of Charles IV. had to be transferred from Aix la Chapelle to Bonn in consequence of the presence of a large number of flagellants. In several places they excited a persecution against the Jews, who were regarded by the people as the cause of the black death. Gradually a stricter organization was effected. Every member of a procession was obliged to confess his sins, to be reconciled with his enemies, to get the consent of his wife, and to be provided with money for about 30 days. This increased, however, the aversion which the ecclesiastical authorities had already conceived against them. The people, on the other hand, began to consider the extraordinary numbers passing through the towns, and partly at least entertained by them, a great burden. In France the king and the university condemned them, and Pope Clement VI. issued a bull against them, when, in 1349, a procession approached his residence at Avignon. Gregory XI. designated them in 1372 as heretics, because they were said to deny the sacraments. Henceforth they generally disappeared in Germany. At the beginning of the 15th century a considerable number of crypto-flagellants collected in Thuringia, but were at once suppressed. Some of them were even burned. The processions which, toward the close of the 14th century, took place in Italy and Spain, were also of short duration.

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The Dominican friar Vincent Ferrerius, who took part in new processions in the 15th century, and for some time protected them by his reputation, was prevailed upon by the council of Constance to withdraw from them.—See J. Boileau, *Historia Flagellantium* (Paris, 1700); Förstemann, *Die Christlichen Geisslergesellschaften* (Halle, 1828), the best work on the subject, based on a thorough study of all the documents relating to it. The documents which have since been discovered have been carefully consulted by Dr. Zacher in his article on the subject in the encyclopædia of Ersch and Gruber.

FLAGEOLET, a small wind instrument of the flute or pipe species, emitting a shrill, clear sound. It is played with a mouthpiece, and the holes and keys are stopped with the fingers.

FLAHAUT DE LA BILLARDERIE, Auguste Charles Joseph, count, a French general and diplomatist, born in Paris, April 21, 1785. His father succeeded Buffon as director of the *jardin du roi*, now *jardin des plantes*, and was executed by the revolutionists. The property of his widow was confiscated; she retired to England with her only son, supporting herself by literary labor, and afterward repaired to Germany. Flahaut enlisted in 1800 in a regiment of volunteers, joining Napoleon's army in Italy, became successively aide-de-camp of Murat, Berthier, and Napoleon, fought in Portugal, Russia, and Germany, and gained particular distinction at the battle of Leipsic, on which occasion he was promoted to the rank of general of division, with the title of count. Subsequently he was made a peer of France, advocated the succession of Napoleon II. to the throne, and was reinstated in his position after the revolution of 1830. For a short time ambassador in Berlin in 1831, he officiated in the same capacity in Vienna from 1841 to 1848, when he was recalled by the provisional government by decree of April 17, which in 1849 however was revoked by the legislative assembly; but he did not resume public life until after the *coup d'état* of Dec. 2, 1851. He then became a member of the consultative commission, senator in 1853, and in 1854 a member of the commission appointed to collect the correspondence of Napoleon I., which has since been published. While in England he married (July 28, 1817) Margaret Mercer Elphinstone, who succeeded to the peerages of the United Kingdom and Ireland as Baroness Keith in 1823, and to the Scottish barony of Nairne in 1838. The saloon of Madame de Flahaut was for a long time a favorite and fashionable resort of eminent politicians. The count was one of the intimate friends of Louis Napoleon's mother, Queen Hortense, who is said to have composed for him her popular air *Partant pour la Syrie;* and he is believed to be the father of M. de Morny.—Adèle Filleul, a French authoress, mother of the preceding, born in the chateau of Longpré in Normandy in 1760, died in Paris, April 16, 1836. Her second husband was the marquis José Maria de Souza Botelho (born in Oporto, March 9, 1758, died in Paris, June 1, 1825), who was for some time Portuguese ambassador in Paris, and who prepared the best edition of Camoëns' "Lusiad." Her first and best work, *Adèle de Sénanges, ou lettres de Lord Sydenham*, appeared in London in 1794, with a preface by the marquis of Montesquiou. It was followed in 1799 by *Émilie et Alphonse*, and by a series of other works, a complete edition of which appeared in Paris in 1821–'2. As a charming and pure writer she holds about the same position in French literature as Madame de Lambert and Madame de Lafayette.

FLAIL, an implement for threshing grain from the straw. It consists of a hand staff about 1½ or 2 inches in diameter, and from 4 to 5 feet long, to which is coupled a shorter staff called a swingel, by the striking of which upon the sheaves the corn is threshed. Flails are very ancient implements, and are divided into two classes according to the kind of the coupling between the hand staff and swingel. In one class the caplins or untanned leather thongs of this coupling are fastened on the hand staff in such a way that it remains stationary in the hands while these caplins revolve around it with each revolution and fall of the swingel; and in the other class these thongs pass through a hole in the hand staff, which consequently turns in the hands with each stroke upon the sheaves. The middle bands of the coupling, being the part which connects the thongs of the hand staff with the caplins on the swingel, are generally made of eel skin. The use of flails in the United States and Great Britain is now for the most part supplanted by the introduction of the modern threshing machines.

FLAMBOROUGH HEAD, a promontory on the coast of Yorkshire, England; lat. 54° 7′ N., long. 0° 5′ W. It consists of a range of steep, and in some places perpendicular chalk cliffs, some of which rise to a height of 450 feet. On the headland stands a lighthouse 214 feet above the sea, with a revolving light visible at a distance of 30 m. The cliffs are perforated by numerous caverns, which during the summer are resorted to by immense numbers of sea fowl. The ruins of an ancient tower and a Danish intrenchment are to be seen on the summit, and the village of Flamborough stands near the centre of the promontory.

FLAME, the luminous appearance commonly accompanying the rapid combustion of bodies in a state of vapor. All ordinary flames are produced by the combustion of hydrogen and carbon; yet these may be made to combine with the oxygen of the air without the appearance of flame, as when a coil of platinum wire heated to redness is suspended over alcohol, or over a mixture of alcohol and ether. The vapors arising slowly consume, generating sufficient heat to keep the wire red-hot, but not enough to burst into flame. A more rapid combustion is required for the production of flame; and this even when so little luminous that it is

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scarcely visible by daylight, as when pure hydrogen is ignited. This flame is nevertheless accompanied with so much heat, that iron wire is made red-hot and plainly luminous by it. If the heat be abstracted, as by encircling a small flame with a coil of wire, the flame will expire. Solid bodies heated in it, as carbon in fine particles, increase its luminousness. The hydrogen is converted into aqueous vapor by uniting with the oxygen of the air, and the carbon, heated to such a degree that it too is disposed to unite with the same atmospheric element, also disappears in invisible vapor. Combustible bodies commonly furnish the two elements of luminous flame combined or intimately mixed, so that they assume the gaseous state together, as they unite in the air with its oxygen. Anthracite and charcoal, however, by their deficiency in hydrogen, lack one of the materials of ordinary flame, and the carbon alone of which they consist unites slowly with oxygen. An imperfect combustion first ensues, and carbonic oxide is generated. This gas plays over the surface of the ignited coal, and receiving from the air with which it comes in contact another atom of oxygen, it gives forth the pale blue flame which is seen proceeding from the surface of this fuel in ignition. Thus the combustion is completed by the production of carbonic acid. The flame of carbonic oxide in combustion is often seen by night hovering over the mouths of lime kilns, too pale to be visible by day. When the gases are poured out from the tall flues of steam engines or other furnaces burning anthracite, the carbonic oxide bursts into a volume of flickering, unsteady flame, as it meets the atmospheric oxygen at the top of the flues, sending out a strange glare into the darkness around. It is this flame which is economically produced under the boilers of engines connected with blast furnaces for smelting iron ores, the unconsumed gases being passed from the mouths of the furnaces into a large chamber, where they meet the air required for their complete combustion. In the production of illuminating gases, whether formed from oils, bituminous coal, or other substances, a portion of carbon is dissolved in the hydrogen, and carried along with it to the point where it is exposed to atmospheric air and the heat required to decompose the compound. The hydrogen at once begins to enter into the new combination with oxygen. In so doing heat is developed, by which the particles of carbon it leaves, and which at once assume the solid form of this element when uncombined, are rendered incandescent, and produce the yellow light of the flame. They are swept upward by the ascending heated current, and, as they come in contact with the air on the margin of the flame, they disappear in the form of carbonic acid gas. The internal part of the flame is a cone of unconsumed gas, which, though transparent, appears dark; it is protected by the outer portions from contact with the air. No combustion takes place within it, as may be shown by placing a white stick across a saucer in which alcohol is burning; the wood will be blackened by burning only at the two points which were against the outer edges of the flame. The wick of a candle in this position does not consume. Gunpowder may be introduced on a small metallic surface into the centre of the flame without ignition. By introducing a small tube into this portion, the gas may be made to pass up any distance, and be ignited at the top, like the gas meeting the air at the top of a chimney stack. The presence of the aqueous vapor may be shown by the dew deposited upon a piece of cold glass held a little way above the flame; and the solid carbon may be caught before its conversion into invisible gas, by placing a piece of white porcelain across the flame, and thus chilling the particles, so that their further chemical change is prevented. A piece of wire gauze being substituted for the porcelain, the inflammable vapors pass through this, but not the flame. They may, however, be ignited above the gauze as well as below, and two independent flames be thus obtained; or in case of a jet of gas being the combustible material, this may be ignited only above the gauze.—As flame is limited in its extent by the amount of surface of gaseous matters exposed to the action of oxygen, it may be increased by directing a current of air through its interior part, thus producing combustion within as well as without. Argand burners are designed to produce this effect. The blowpipe also serves the same purpose, concentrating at the same time that it increases the heat. In the luminous jets which it makes the different qualities of the different portions of the flame are plainly exhibited, the greatest heat being produced just without the point of the yellow flame, where is the most intense combustion. Outside of this, particles submitted to the action of the blowpipe flame are oxidized by contact with the atmospheric oxygen; within it, at the point of the interior flame, they are deoxodized, and oxides of many metals are reduced to a metallic state. (See BLOWPIPE.) The form of the chimney surrounding the flame is also designed to cause the air rising through it to be turned by striking against its shoulder and impinge upon the outer portion of the flame, thus increasing its intensity. This effect is the more decided from the high temperature of the ascending current. Various substances impart characteristic hues to flame; sulphate of strontian gives a beautiful purple, copper filings and sal ammoniac a greenish tint, zinc a fine blue, &c. (See PYROTECHNY.) The appearance of such colors in the use of the blowpipe serves as an indication of the presence of the substances that commonly produce them. (See BUDE LIGHT, and DRUMMOND LIGHT).

FLAMEL, NICOLAS, a French scribe and reputed alchemist, born in the first half of the 14th century, died in Paris, March 22, 1418. He combined the occupations of copyist and bookseller, married Pernelle, a widow of some property, and also received pupils in his house, to whom he taught writing and the ru-

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diments of letters. The means which he thus acquired were profitably invested, and the products of his industry and rents enabled him to build hospitals, found chapels, and endow churches, which he often adorned with paintings and sculptures, especially with bass-reliefs of himself and wife. One of his free lodging houses was still standing in 1856, in the rue de Montmorency, in Paris, with the original inscription. He seems to have been a sagacious citizen, skilful in making money, ambitious of renown, and imitating the devout and ostentatious benevolence of the princes of his time. His fame increased after his death, and the attempt to account for a fortune which had perpetuated itself in many monuments, and been magnified by popular credulity, resulted in attributing to him the possession of the philosopher's stone, and the secret of making gold. In 1561 the *Sommaire philosophique*, a metrical treatise on alchemy, was published probably by Gohorry, under the name of Flamel; and it completely established his reputation as an alchemist till Vilain critically investigated his history (1761). It has been supposed that the Jews, who were then much persecuted in France, made him the depositary of their wealth; and others have supposed that the cabalistic book of *Habraham Juif*, which he is said to have studied, contained emblematic signs of the various places where the Jews, expelled from the kingdom, had buried their treasures.

FLAMEN, in Roman antiquity, a member of an ancient college of priests, established by Numa, each of whom was confined to the service of a particular deity. The original 3, the *dialis*, *martialis*, and *quirinalis*, consecrated to Jupiter, Mars, and the deified Romulus, were afterward distinguished as *majores*, and chosen from a select class of the patrician order (see CONFARREATIO); while the later 12, called *minores*, were elected from the plebeians. Their dignity was for life, but could be forfeited by neglect of duty, or lost in consequence of an ill-omened event disturbing any of their sacred performances. Their official dress was the *apex*, a cap, either conical or close-fitting, having at the top a pointed piece of olive wood, surrounded at its base by a lock of wool (*filum*, whence, according to some, their name, while Plutarch derives it from *pileum*, hat), the *lana*, or mantle, and the laurel wreath. The most distinguished member of this college of priests was the *dialis*, honored with the privileges of a seat in the senate, the *toga prætexta*, a lictor, and the higher prerogative of procuring pardon or respite for criminals who came to him for refuge; but he was also burdened by several restrictions, being forbidden, for instance, to leave the city even for a single night, to swear an oath, to wear a ring, to ride or touch a horse, and to remarry after the death of his wife, who assisted him in the performance of some of his sacred functions, and was called *flaminica*. In later times the deified emperors of Rome had particular flamens appointed to their worship.

FLAMINGO, a wading bird of the order *anseres*, family *anatidæ*, sub-family *phœnicopterinæ*, and genus *phœnicopterus* (Linn.). The bill is longer than the head, high at the base, compressed, suddenly bent at a right angle in the middle, the sides growing narrower, and rather obtuse at the tip; the lateral margins are incurved and finely laminated; the base to around and behind the eye is covered with a soft and delicate skin, finer than the finest kid, the end being corneous; the nostrils are near the base, linear, 1¼ inches long; length about 5 inches; beyond the curve the color is black, the base being orange and yellow. The wings are moderate, with the 1st and 2d quills nearly equal and longest; the tail is 6 inches long; the tibia is lengthened and naked, and the tarsi very long and slender, and both covered by transverse scales; the toes are short, the anterior ones united by a membranous web; the hind toe is very short, almost touching the ground, and free; the claws are short and flat. There are 5 or 6 species, inhabiting the warmer parts of the globe, frequenting the sea-shore and marshes in considerable flocks; one acts as sentinel while the rest are feeding or resting, and on the approach of danger gives the alarm by a trumpet-like noise, and starts off leading all the rest; they fly either in triangular lines like the wild goose, or in Indian file when they are about to alight; they can run quickly, but when walking are said to assist themselves by placing the upper mandible on the ground; though web-footed, they do not swim, the webs serving to support them in wading over soft mud. The food consists of mollusks, crustaceans, fish spawn, marine insects, and small fish; the singular form of their bill enables them, by turning it toward the body, to place the upper mandible downward, and thus to collect their food as in the bowl of a spoon. The small head, angular-shaped bill, long and slender neck, stilt-like legs, comparatively small body, and brilliant colors, render the flamingo one of the most extraordinary forms among birds.—The American flamingo (*P. ruber*, Linn.) is about 4 feet long from bill to end of tail, and 5½ feet to end of claws; the extent of wings is 5½ feet, each wing being 16½ inches; the tarsus 12½ inches; bill along gape 5 inches, along the curve 6 inches; middle toe 3½ inches; the circumference of the body is only 24 inches, and the weight about 7½ lbs.: the female is considerably smaller. The space between the bill and eye is bare, but the plumage generally is compact and the feathers rounded, those on the neck being short; the color is a bright scarlet, deepest on the wings; the quills are black, the legs red, the feet lake color, and the iris blue. The habits of the flamingo are more nocturnal than those of the herons; over the water they fly low, but over the land very high, with neck and legs extended, alternately flapping their wings and sailing; before alighting they generally sail around the place, and come down in the shallow water, often wading to the shore; they are very shy

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and difficult to approach. The nest is made on a hillock of mud about 2 feet high, in the hollow top of which the eggs are laid on the bare earth; they are 2 or 3 in number, of a white color, and about the size of a goose egg; the bird covers the eggs standing, with one foot in the water, and the young are hatched about the end of May; as soon as born they are said to take to the water, and cannot fly till they are 3 months old; they do not attain their full scarlet plumage until the 2d year, being rose-colored during the first. On account of its shyness the flamingo is rarely hunted, and then only for its handsome feathers. It is easily tamed, and in captivity feeds on rice, maize, and similar substances. It inhabits the warmer parts of America, especially the West Indies; it is not uncommon in West Florida and northern Alabama, and is rare to the north and west of these points. The European bird (*P. antiquorum*, Temm.) is smaller and less brilliant. It is a regular visitant to the shores of the Mediterranean, and sometimes wanders to France and Germany; it is extensively spread over the warmer parts of Asia, and is very common along the shores of northern Africa. Its appearance and habits are the same as in the American species. According to Gould, this species requires 4 years to reach maturity, during which the plumage changes greatly; before the first moult the color is uniform gray, with black tail and secondaries; in the male, the head, neck, upper and under surfaces, are a delicate rosy white, the centre of the wing bright scarlet, the primaries black, the bill reddish at the base and black at the tip, the tarsi and toes rosy red; the scarlet color is not assumed until the 3d or 4th year, and is brightest during spring and summer. Other species are the *P. Chilensis* (Mol.), *ignipalliatus* (D'Orb.), and *parvus* (Vieill.). The flesh of the flamingo is savory, and its fatty tongue is considered a delicious morsel; they were especially esteemed by the ancient Romans, and many allusions to this dish are found in their writings.—The position of the flamingo among birds has been and is a subject of dispute; some authors place it among the waders or *grallæ*, from its long neck and legs, and consequent habits; while others, and the best authorities, rank it among the *anseres*, or web-footed swimmers, on account of its lamellar duck-like bill, webbed feet, and muscular gizzard; if it be true that the young run to the water as soon as they are born, this of itself would seem to establish their rank among the *anseres*.

FLAMINIAN WAY (Lat. *via Flaminia*), the principal road leading from ancient Rome to the northern provinces, constructed in 220 B. C., in the censorship of C. Flaminius, from whom it was named. It extended to Ariminum, now Rimini, on the Adriatic, a distance of about 220 m., where it joined the Æmilian way. It divided into 2 branches at Narnia, now Narni, in Umbria, which met at Fulginium (Foligno), again dividing at Nuceria (Nocera), and meeting at Fanum Fortunæ (Fano). It was a road of great importance for commercial and military purposes, and still retains many of the bridges and other works erected by the Roman emperors.

FLAMININUS, Titus Quintius, a Roman general, born about 230 B. C., died about 175. He was elected consul in 198, and undertook the conduct of the war against Philip II., king of Macedon. By pretending that his object was to remove from Greece the Macedonian yoke, he detached many of the Greek states from Philip, and defeated him at Cynoscephalæ (197), in Thessaly, where the Roman legion demonstrated its superiority over the famous Macedonian phalanx. By the treaty which was soon after concluded Philip surrendered all the Greek towns which he possessed in Europe and Asia, and paid a heavy contribution to the Romans. At the Isthmian games in 196 Flamininus proclaimed, to the great joy of the assembled Greeks, the freedom of those states which had been subdued by Macedon. In 195 he diminished the power of the tyrant Nabis of Sparta, after which he occupied himself in restoring internal peace and prosperity to Greece. The next spring he returned to Rome, where his triumph lasted 3 days. In 183 he was sent as ambassador to Prusias, king of Bithynia, to seek the surrender to the Romans of Hannibal, who had obtained an asylum there.

FLAMINIUS, Caius, a Roman general, killed June 23, 217 B. C. He was tribune of the people in 232, consul in 223 and 217, and censor in 220. As tribune he carried against the opposition of the senate an agrarian law. In his first consulship he with his colleague attacked the Gauls beyond the Po, and was defeated. The senate then recalled the consuls, but Flaminius resisted the order by refusing to open the letter, and obtained a victory over the Insubrians. A triumph was refused him on his return, but he was rewarded with demonstrations of popular favor. The *circus Flaminius* and *via Flaminia* were the monuments of his censorship. In his second consulship he marched against Hannibal, and rashly giving battle, was slain, with the greater part of his army, on the border of Lake Thrasymenus.

FLAMSTEED, John, the first English astronomer royal, born in Denby, near Derby, Derbyshire, Aug. 19, 1646, died in Greenwich, Dec. 31, 1719. He was educated at the free school of Derby, where his father lived, and at a very early age manifested a strong inclination for astronomical studies. His health was so delicate that he was not sent to a university, but continued for several years to prosecute his astronomical researches at home with great success. In 1667 he demonstrated the true principles of the equation of time, in a tract which Dr. Wallis subsequently appended to his edition of the works of Horrocks. Flamsteed appears to have been the first astronomer who brought into common use the method of simultaneously observing the right ascension of the sun and stars, a mode by which the true

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place of any star is determinable by means of meridional altitudes and transits. In 1669 he communicated to the royal society his calculation of a solar eclipse that had been omitted in the ephemerides for the following year, together with several other astronomical observations. This communication was submitted to a committee of that body, who sent him a letter of thanks. In 1670 he visited London in company with his father, and was introduced to the savants of the metropolis. When returning to Derby, he passed through Cambridge, where he entered himself a student of Jesus college, and made the acquaintance of Wroe, Barrow, and Newton. In 1673 he composed his treatise on the "True and Apparent Places of the Planets when at their Greatest and Least Distance from our Earth," a work of which Newton availed himself in his first edition of the *Principia*. In 1674 appeared his *Ephemeris*, which, with 2 barometers previously constructed by him, was presented by his friend Sir Jonas Moore to Charles II., and his brother, the duke of York. In 1675, having long before decided on entering the church, he was admitted to holy orders. Soon after this period, the king's attention having been called to the enormous errors of the astronomical tables then in use, he resolved to found an observatory, of which Flamsteed, through the mediation of Moore, was appointed the first director. The erection of the observatory was completed in 1676, but the astronomer had already entered on the discharge of his duties, having established himself in Greenwich. The new observatory received the name of Flamsteed house. It was so inadequately supplied with astronomical apparatus that its principal, out of his scanty salary of £100 a year, often not regularly paid, and his other limited resources, had to provide most of those instruments which were indispensable to the successful prosecution of his researches. Here, however, notwithstanding every disadvantage, Flamsteed composed his great work, *Historia Cœlestis*, the period of whose publication forms an epoch in the annals of modern astronomy. In 1684 he was presented by the lord keeper North to the small living of Burslow in Surrey, the only ecclesiastical preferment he ever obtained. Mr. Francis Baily's discovery of his papers and correspondence, in 1832, has thrown much light on the history of his differences with Newton and Halley. These documents give us Flamsteed's version of those unseemly squabbles, and it is not at all favorable to the reputation of those great masters of science; but there is another account of these matters in Sir David Brewster's "Memoirs of the Life, &c., of Sir Isaac Newton," which makes their conduct toward him appear less culpable, though neither just nor generous, than Flamsteed would lead us to suppose. His *Historia Cœlestis Britannica* (3 vols. fol., London, 1725) was not published complete till after his death, though a partial edition had been issued in 1712, against his protest, by Halley, under authority of a committee composed of Sir Isaac Newton, Sir Christopher Wren, and others. The 1st volume contains his observations on the fixed stars, planets, comets, &c.; the 2d, the transits of stars and planets over the meridian, with their places; the 3d, an account of the methods and instruments used by Tycho Brahe and himself, and various catalogues of fixed stars, including his own catalogue of 2,934 stars. He also prepared an *Atlas Cœlestis*, as an accompaniment to the above work, which appeared in 1729.

FLANDERS (Fr. *Flandre*, Flemish *Flandern*, Dutch *Vlaanderen*), formerly a part of the Netherlands or Low Countries of western Europe, now included in Belgium, Holland, and France. Stretching along the German ocean from the W. inlet of the Scheldt to the entrance of the straits of Dover, it was bounded N. and E. by that river and its branch the Dender, while on the S. it joined the province of Artois, the old country of the Atrebates. The name occurs for the first time in the 7th century, when Eligius, bishop of Noyon and treasurer of King Dagobert I., visited northern Neustria. By the treaty of Verdun, 843, Flanders was included in the kingdom of France, and in 863 it was erected into a county under the rule of Baldwin of the Iron Arm, son-in-law of King Charles the Bald. Baldwin's successors took rank among the 6 lay peers of France, and figured conspicuously in French history. His family having become extinct in 1119, the county was held until 1127 by Charles I. the Good, son of Canute, king of Denmark; then for a year by William Cliton, the nephew of Henry I. of England; and finally by Thierry, son of the duke of Lorraine, whose dynasty, known as the Alsatian, reigned until 1280. A last family of counts was inaugurated by Guy de Dampierre, and lasted until 1384, when Flanders was united to the states of Philip the Bold of Burgundy, who had married the heiress of the last count. At the death of Charles the Bold in 1477, his daughter Mary, by marrying the archduke Maximilian, brought Flanders to the house of Austria. It was incorporated by the emperor Charles V. among the 17 provinces which formed the circle of Burgundy. On his abdication it became one of the dependencies of Spain, which lost a portion of it by its northernmost section being annexed to Seeland when the 7 United Provinces declared their independence. Afterward a portion of its southern territory was conquered by Louis XIV., and received the name of French Flanders. In 1713 the peace of Utrecht transferred Flanders from Spain to Austria. In 1792 it was invaded by the French, who held it until 1814, during which period it formed the departments of Lys and Scheldt. On the fall of the French empire, it was given to the king of the Netherlands, who divided it into 2 provinces, East and West Flanders, which since 1831 have constituted an important part of the kingdom of Belgium. In spite of so many revolutions, Flanders has always been

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distinguished for its industrial, commercial, and agricultural prosperity. As early as the 12th century its cities had acquired considerable importance through their manufactures, and had secured a certain degree of freedom. The democratic spirit kept even pace with the progress of trade and industry; and in the following centuries the Flemish cities were so many republican communities, governing themselves, and paying little more than a nominal obedience to their counts. They more than once took the management of affairs into their own hands, and successfully resisted their lord paramount, the king of France. Such was the case in 1337, when Jacques van Artevelde, the brewer of Ghent, expelled Count Louis I. from the country, caused his countrymen to acknowledge Edward III. of England as king of France, and held for a while the balance between the two great contending nations. Even when the cities of Flanders consented to submit to their sovereigns, they protected their liberties and privileges against any encroachment, which fact is clearly evidenced by their repeated revolts during the 14th and 15th centuries. The interest of their lords, however, was to deal mildly with subjects from whom they could obtain immense sums of money by voluntary taxation. It was through them indeed that the house of Burgundy became the wealthiest in Europe, for they had then reached the height of their prosperity; many burgesses of Ghent, Ypres, and Bruges had princely fortunes, and plenty was apparent everywhere. Charles V., by forbearance and skilful management, conciliated the Flemings, and even the despotism of Philip II. could not entirely alienate them from Spain. Flanders is still a well cultivated country, famous for its industry and commerce, and forming the richest part of Belgium; but the indomitable spirit of old times has been tamed into a moderate love of political liberty. (See Flemish Language and Literature.)

FLANDERS, East, a province of Belgium, bounded N. by Holland, E. by the Scheldt (separating it mostly from the province of Antwerp) and by South Brabant, S. by Hainault, and W. by West Flanders; area, 1,154 sq. m.; pop. in 1856, 776,960. It forms an extensive plain, drained by the Scheldt and its tributaries, which, being united by canals, afford ample water communication. Its soil is not of superior quality, but is industriously cultivated, and it gives excellent crops of flax, hemp, wheat, rye, colewort, hops, beets, potatoes, and other vegetables. Great numbers of cattle are raised. Manufactures are in a prosperous condition, and comprise linen, woollen, and cotton fabrics, and beet-root sugar. Capital, Ghent; other chief towns, Oudenarde, Termonde, Eecloo, Alost, and St. Nicholas.

FLANDERS, West, a province of Belgium, bounded N. W. by the German ocean, S. W. by France, and E. by the Belgian provinces of Hainault and East Flanders; area, 1,250 sq. m.; pop. in 1856, 624,912. Beside the Lys and the Scheldt, by which it is watered on the S., it has only small streams emptying into the sea. Its surface is generally flat; and although most of its soil is sandy and poor, it has been, through untiring industry, so much improved that it yields abundant crops of wheat, oleaginous plants, flax, and tobacco. Cattle and horses are abundant. The manufacture of linen and damask is the principal branch of industry. Capital, Bruges; other chief towns, Ostend, Furnes, Ypres, Courtray, and Dixmude.

FLANNEL, the plainest fabric of woollen yarns, commonly slightly woven. It is well adapted for under clothing where the temperature is changeable, the material being a poor conductor of heat, and readily absorbing perspiration, which slowly evaporates from its surface without chilling the body. Flannels are also made of yarns into which cotton is introduced in various proportions; and again of a warp of cotton thread crossed by woof of woollen yarns. A most delicate flannel for the wear of infants consists of silk and wool. Cotton or Canton flannel is a twilled fabric, wholly composed of cotton, a nap being raised on one side of the stuff.

FLAT, in music, the character ♭ used to denote that the note before which it is placed is to be depressed a chromatic semitone below its natural pitch. Thus D ♭ signifies a semitone below D natural (D).

FLATBUSH, a post village and township of Kings co., N. Y., memorable for a British victory over the Americans in 1776; pop. in 1855, 3,280. It is the seat of an academy called Erasmus Hall, and contains several churches.

FLATHEAD INDIANS, a term applied to some of the aboriginal tribes inhabiting Oregon near the mouth of the Columbia river, and along the N. W. coast of America from Salmon river in lat. 53° 30′ N. to Umqua river in 46° N.—the Nootka Columbians of Dr. Scouler. The name is derived from the practice of flattening the skulls of their infants by various mechanical contrivances; the model of the deformity is the same in all the tribes, and much like that observed in the ancient Peruvian crania. The forehead is depressed and indented; the upper and middle parts of the face are pushed back so that the orbits are directed a little upward; the head is so elongated that in extreme cases the top becomes nearly a horizontal plane; the parietals are bent so as to form an acute angle, and instead of the occiput constitute the posterior portion of the head; the breadth of the skull and face is much increased, and the two sides are in most cases unsymmetrical. The best known tribes which flatten the heads of their children are the Chinooks, Calapuyas, Clickitats, Clatsops, Cowalitsk, and Clatstani. Among the Chinooks the child is placed in a wooden cradle, and a pad of grass is tightly bandaged over the forehead and eyes, so that it is impossible for him to see or move; and when bandaged and suspended in the usual way, the head is actually lower than the feet.

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A more cruel way is practised in other tribes by binding a flat board obliquely on the forehead. These processes continued for several months produce the coveted deformity, which, however, according to Dr. Pickering, disappears with age, so that most adults present no trace of it. This shape of the head is so highly prized among the Chinooks that their slaves are not allowed to practise artificial flattening. The internal capacity of the skull is not diminished by the flatness, and the intellect is not affected, as all travellers agree that these nations are remarkably shrewd and intelligent; it is said, however, that they are particularly subject to apoplexy. The Chinooks are the best known of the Flatheads; they inhabit the S. shore of the straits of Fuca, and the deeply indented territory as far as and including the tide waters of the Columbia river. They are commonly of diminutive stature, with ill-shaped limbs and unprepossessing features; the oblique eye and the arched nose are occasionally seen among them; their complexion is darker than that of the more northern tribes who do not flatten the head They have the filthy habits and the usual vices of the N. W. Indians, but are said to be superior to the hunting tribes of America in the useful and ornamental arts; their climate is comparatively mild and moist from the prevalence of westerly winds, and they are a fishing and maritime people. They differ from the northern tribes in language as well as in physical characters; they speak in a quiet, deliberate manner, and their words can hardly be represented by any combinations of known letters. Dr. Pickering says they have no method of salutation or of expressing approbation. They are regarded as a dangerous race by travellers. Dr. Morton, in plates 42 to 50 of the *Crania Americana*, gives descriptive illustrations of several skulls of the Columbia river tribes. They are rapidly diminishing in numbers from diseases and vices introduced by the whites; there is probably not a tribe that can number 500 individuals, and many in Mr. Schoolcraft's tables are placed below 100; the whole Indian population of Oregon is not much above 20,000. The Flatheads S. of the Columbia river, or the Salish, are only about 300 souls; they are said to occupy 60 lodges on St. Mary's river, in Washington territory, E. of the Cascade mountains. The custom of flattening the head is very ancient, but the modern Indians, except those of the N. W. coast, do not generally practise it; it was a custom in Peru before the arrival of the Incas, and was practised also by the Inca Peruvians to a comparatively recent date. It seems to have been principally employed by the Toltecan branch of the American nations, including the semi-civilized race of Mexico, Peru, and Central America, and the ancient mound builders of the Ohio and Mississippi valleys; the Natchez tribe of Florida and the southern states, the Choctaws, and the Caribs (both insular and continental) flattened the skulls of their children by various devices either in a vertical direction (as in the Natchez) or a longitudinal one (as in the ancient Peruvians). The flattened skull must be classed among the strange whims of nations, with the small feet of the Chinese, the perforated ears and lips of savages, and the tapering waists of Europeans.

FLAVEL, John, an English clergyman and author, born in Broomsgrove, Worcestershire, about 1627, died in Exeter, June 26, 1691. He was educated at Oxford, and became a curate at Diptford, from which place he was called in 1656 to Dartmouth. He was one of the 2,000 clergymen who refused to subscribe to the "Act of Conformity," passed in 1662, and was therefore expelled from his benefice. He continued, however, to preach as opportunity offered, in private dwellings, obscure neighborhoods, or forests, till 1687, when the royal license being granted to worship without molestation, he resumed his public labors in a new church erected by his people. Most of his works, which are held in high esteem and have been many times reprinted, were composed during the period of his persecution. "Husbandry Spiritualized" is one of the most popular; among his other chief works are: "A Treatise of the Soul of Man," "The Fountain of Life," "The Method of Grace," "A Token for Mourners," &c. An edition in 6 vols. 8vo. appeared in London in 1820.

FLAX, the common name of the plant *linum usitatissimum*, and also of its most important product, the filaments obtained from the fibrous covering of its hollow stems, used from the remotest times in the manufacture of linen thread. The coverings of the Egyptian mummies testify that the linen mentioned by the most ancient writers was the product of the flax plant, still cultivated for its valuable fibre. This, however, is not the only useful product of the plant. Its seeds furnish the important oil called linseed oil; and of the residue, after this is expressed, is made the oil cake which is extensively used for feeding and fattening cattle. On account of its mucilaginous character, flax seed is also employed in medicine, its infusion in boiling water having a soothing effect in cases of inflammation of the lungs, intestines, &c.; and when ground to meal and mixed with hot water, it forms an excellent emollient poultice. The flax plant is a slender annual, growing from 2 to 3 feet in height, bearing small lanceolate leaves distributed alternately over the stalks. These terminate in delicate blue flowers, which are succeeded by globular seed vessels of the size of small peas, containing each 10 seeds. These are oval and flat, of brown color, and remarkably bright, smooth, and slippery. The outer portion or husk is mucilaginous, yielding 52.7 per cent. of a pure gum soluble in cold water; and the interior portion yields the peculiar oil already referred to. The plant, now cultivated in almost all parts of the world, is supposed by many to have been first known in Egypt, or possibly in the elevated plains of central Asia; but though no doubt a native of warm climates,

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the fibre attains its greatest fineness and perfection in temperate regions. The seed, however, is richer in the tropics. Near the northern limits of its cultivation the product of the flax is abundant, but the quality is inferior. The flax of Holland and Belgium is rated as worth from $750 to $900 per ton, while that of Russia, whose export is from 40,000 to 50,000 tons annually, brings only about $240 per ton. This difference is, however, to be attributed in part to the extreme care given by the Hollanders and Belgians to its preparation. The Irish, who have cultivated the crop from the early period when the plant was introduced into their country, and who would seem to possess as great natural advantages for its successful culture as any people, rarely furnish so valuable an article as the Belgians. The reason is thus given in a document published by the Belgian government in 1841: "The flax of Ireland, when first pulled, is as good as ours, but the Irish are negligent. Our flax is immediately put in water; theirs is left to get heated in the air, while they go away to drink and enjoy themselves. Our peasants are watchful, and take the flax at the end of 5 or 8 days, according to the condition they find it in; the Irish do it just when they please. Our flax, when covered with mud, is spread out carefully in a fine meadow, when the first shower cleanses it; in Ireland it is thrown down almost anywhere. The women with us often take the preparation of the flax upon themselves; but in Ireland the flax is prepared in mills." The product of Ireland is estimated at from 25,000 to 30,000 tons per annum; and with what is grown in Yorkshire, Somersetshire, and the south of Scotland, the whole produce of the British isles is rated at about 35,000 tons, while the consumption varies from 80,000 to 105,000 tons. The greater part of the importation is from Russia, and the countries bordering on the Baltic. About 5,000,000 lbs. are obtained from Belgium, which is about ⅛ of its whole product, the total value of which is calculated at $12,500,000. The rich soil of the valley of the Nile is well adapted for its cultivation, and the product of Egypt is increasing under the encouragement given by the English, who find it more economical to procure their supplies from foreign countries than from their own. Flax appears to have been cultivated in New Netherlands as early as 1626. The seed of flax was ordered to be introduced into the colony of Massachusetts in 1629, and flax was cultivated in that state soon after the war of independence, particularly at a distance from the coast. Manufactories for making sail cloth were established at Salem and Springfield in 1790. In Virginia flax was annually cultivated, spun, and woven by Capt. Matthews prior to 1648. Bounties for its production in that colony were offered in 1657. Flax was among the products for the encouragement of whose cultivation the British parliament made considerable grants to the patentees of Georgia in 1733, 1743, and 1749. Early attention was given to the cultivation and manufacture of flax in Ohio, Kentucky, and Indiana. The amount of flax seed exported from Philadelphia increased from 70,000 bushels in 1752 to 110,412 in 1771. The production of flax in the United States according to the last census (1850) was 7,709,676 lbs., of which 2,100,116 lbs. were raised in Kentucky, 1,000,450 in Virginia, and 940,577 in New York; and of flax seed 562,307 bushels, of which 75,801 bushels were raised in Kentucky, 52,318 in Virginia, and 57,963 in New York. The amount of flax raised in the Union in 1853 was estimated at 8,000,000 lbs. The production has hitherto been entirely for home consumption, but efforts have lately been made to increase it. The imports of unmanufactured flax during the year ending June 30, 1858, were valued at $197,934.—The flax crop thrives upon almost any good soil thoroughly pulverized and well drained, but more especially upon rich sandy loams regularly supplied with moisture during the spring months. In Ohio, 3 pecks of seed are sown to the acre, which yields from 6 to 12 bushels of seed and from 1 to 2 tons of straw, which is manufactured into tow for rope walks and paper mills. It may be sown very early in the spring, and to good advantage succeeding a crop of grain. As it is gathered in July or early in August, another crop may be obtained from the same land during the season. A common practice with the Belgians is to sow the white carrot broadcast with the flax, and when the latter is gathered, which is done by pulling the plants by the roots, the soil is loosened around the young carrots, and being then top-dressed with liquid manure, they thrive luxuriantly. Grass or clover seed is also often sown immediately upon the flax seed. The better soils take 3 bushels of seed to the acre, the poorer 2 bushels. The finest fibre is obtained by a thick growth of slender stalks. The Dutch take great pains to weed the crop by hand, when the plants are 2 or 3 inches high. In June the plants are in bloom, and the fields present a beautiful appearance, covered with the delicate blue flowers. The time for gathering is indicated by the leaves beginning to drop off, and by the bottom of the stalks becoming yellow; also by the condition of the seed bolls, which should be examined almost daily about the time of maturity of the crop. When the ripest on being cut open with a sharp knife do not appear within whitish and watery, but firm and dark green, the flax is fit for pulling. Soon after this the seeds would begin to fall, and the fibre would lose its silkiness and elasticity. But if it be desired to obtain seed for sowing, the plants must be allowed to fully ripen at the cost of the deterioration of the fibre. As the flax is pulled, it is gathered in bundles to dry; and then if the seeds are thoroughly ripened, they may be separated by the threshing mill. The ordinary course, however, is to strip the seeds by the process called rippling, which is drawing the stalks, a handful at a time, through a set of iron teeth standing in a row, ½ inch apart at top and ¼ inch at bottom.

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Four men with two rippling combs will separate the seeds, it is estimated, from more than an acre of flax in a day. The seed bolls should be well dried, and then stored away in bags in an airy place. At convenient times they are threshed and winnowed to separate the seed from the capsules, preparatory to obtaining by expression the oil and the oil cake. The culture of flax and its preparation for market involve more labor than almost any other crop. The seeds are preferred which are brought from Riga, and next to these the Dutch; the American produce a coarser stem. The soil should be thoroughly prepared by repeated harrowing after deep ploughing. The weeding requires peculiar care, that it may be sufficient without injury to the young plants. The soil should be kept rich by judicious manuring; for flax is commonly regarded as an exhausting crop. The plan of returning to the soil the water in which the stalks are steeped, by which it is estimated $\frac{1}{6}$ of the nutritious matter taken away are restored, is highly recommended. The pure fibre yields no ashes, so that it takes nothing from the soil, and the manure of the cattle fed upon the oil cake will restore much of the solid constituents of the seeds. Dr. Ure gives the following mixture of salts, "which it has been said will replace chemically the constituents of the plants produced from an acre of land, viz.: muriate of potash, 30 lbs.; common salt, 28; burned gypsum, powdered, 34; bone dust, 54; sulphate of magnesia, 56." The preparation of the flax for market finds occupation for the cultivators in the winter season; but this can be economically conducted only where many are engaged in the culture, and mills are provided with the requisite machinery. In the flax districts of Belgium it is stated there are no paupers, as the whole population find employment during the winter.—The first process in the preparation of the fibre is to steep the stalks in water, until fermentation takes place. This causes the glutinous matter, which binds the harl or the fibrous portion to the woody core, called the boon, to be decomposed, and the fibres are thus set free. The water most suitable for this purpose is soft river water. The flax is left more free from color by a stream of water flowing over the bundles than if these are steeped, as is often done, in a pool, the water of which is kept to be applied to the soil. This process is called water-retting or rotting. The result is sometimes obtained by exposing the flax on grass plots to the dew and rain, when the operation is called dew-retting. This requires much longer time, and also the control of extensive grass fields. It is an excellent method to combine the two processes, commencing with the water-retting, and when the boon is partially rotted and the gummy matter loosened, to complete the operation upon the grass; the risk of carrying the fermentation too far and injuring the fibre is thus avoided. When the steeping process alone is employed, the flax is removed from the water as soon as the harl is found to separate by the fingers from the boon, and this breaks without bending. At this stage also several stalks knotted together sink in the water. The duration of the process is from 6 to 20 days. The riper the plant, the longer is the time required; hence the necessity of sorting the stalks into bundles of similar qualities. The bundles, being lifted out of the water by hand, are set on end to drain for 24 hours, and the stalks are then spread upon grass, and occasionally turned, to be softened and ripened by exposure for several days. When again gathered and made into sheaves, these may be kept for years in stacks, the quality of the fibre continuing to improve for some seasons. Though the fermenting process is not intended to pass to the putrefying stage, a disagreeable odor is given out from the flax, which even contaminates the air of the district, and the waters are so affected that the fish are poisoned. A more expeditious and agreeable process was therefore highly desirable, and such was devised by the late Mr. R. B. Schenck of New York, and successfully introduced into the flax districts of Ireland in 1847. This consisted in steeping the stalks in water heated by steam pipes to a temperature of about 90° F. The gummy matter is thus rapidly decomposed, so that in about 60 hours the operation is completed without the escape of any disagreeable odors. The mucilaginous water is then drawn off, and the flax is set to dry upon frames, the waste steam of the engine being used, if necessary, to heat the air for hastening the drying. By this process time is economized, a serious nuisance is abated, and the fibre of the flax is rather improved in strength and color, if care has been taken that the water be not over-heated or the operation too long continued. Other improvements have also been introduced, as that of Mr. Bower of Leeds, which consists in rolling the stalks after they have been steeped in cold or warm water, again steeping, and again rolling. The glutinous matter is thus more thoroughly removed. The addition of a pound of caustic ammonia or of common salt or Glauber salt to every 150 pounds of rain water is recommended; and the temperature being kept at from 90° to 120°, the operation may be completed in 30 hours. The most rapid process, however, is to steep the flax for a short time, and then exhaust the air from its fibres by the action of an air pump. Twice steeping and twice exhausting the air serve to remove the glutinous matter in a few hours. Attempts have been made to substitute for the retting mechanical methods of separating the fibre from the boon, but they have not been successful, owing to the inferior quality of the filaments thus prepared. The introduction of chemical matters to hasten the fermentation has been greatly objected to from their liability to weaken the fibres. The reducing of the fibre to the condition of cotton by the process of the chevalier Claussen has excited strong opposition on this account. He had observed that the flax caught in the branches overhang-

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ing a stream in Brazil, which ran through his flax fields, was by repeated wetting and exposure converted into a substance exactly like cotton. He then contrived a way of attaining the same result by exposing the flax to the action of a weak alkaline solution, and afterward removing the alkali by boiling in water to which $\frac{1}{100}$ to $\frac{1}{200}$ of sulphuric acid is added. The straw is next steeped in a strong solution of bicarbonate of soda; and when the fibres are filled with this salt, it is transferred to a solution of sulphuric acid, weak like the former. Carbonic acid gas is generated throughout the substance, and this bursts and splits the fibre in a remarkable manner, giving it the appearance of cotton. Samples of various fabrics of this material, both alone and mixed with cotton, and others with wool, and also with silk, were placed by Claussen in the London exhibition, and attracted much attention. The same article, however, appears to have been made in England and Germany during the last century, and a factory was established near Vienna in 1780 for its manufacture. Berthollet, Gay-Lussac, and Giobert have experimentally investigated the subject, and Berthollet states that as fine cotton may be obtained from the commonest refuse tow as from the best flax. For some reason, however, possibly the expense of the process or the inferior quality of the fibre, the operation does not seem to have prospered. A favorable account of it is given in Tomlinson's "Cyclopædia of Useful Arts." Dr. Ure treats it as uncertain of success.

—After the flax has been retted and dried, it is submitted to the process called breaking, by which the straws are cracked repeatedly across, the effect of which is to produce the separation of the brittle woody portion, which falls away in pieces from the filaments, as these are afterward beaten by a broad flat blade of wood in the operation called scutching. A variety of machines are used for cracking the boon. The most simple of them is made with a large wooden blade worked by a handle at one end, and fastened by a pivot at the other into a block with a cleft into which it fits; across this block the flax is laid, a handful together, broken by the blade, and moved along, as straw or hay is chopped in a common cutter. Other brakes are worked by the foot—a grooved block being brought down by each impulse upon the flax, which is held across a fixed block with corresponding grooves; a rude spring jerks the movable block up again as the foot releases it. In the winnowing or scutching the Germans make much use of a thin sabre-shaped wooden knife, with which they strike the flax as a handful of it is held in a horizontal groove in an upright board. The coarse tow and woody particles are thus removed, those which adhere most firmly being scraped or rubbed off by laying the flax upon the leather worn for this purpose upon the leg of the operator. It is estimated that 100 lbs. of dried retted flax should yield 45 to 48 lbs. of broken flax; and from this when the boon waste is further removed by scutching about 24 lbs. of flax are obtained and 9 or 10 lbs. of tow. The breaking of 100 lbs. of straw by the machine described requires the labor of 17 to 18 hours; and the cleaning of 100 lbs. of broken flax by the swinging knife requires about 130 hours. Flax is broken also upon a larger scale by machines consisting of fluted rollers, variously contrived; and other labor-saving machines with rotating blades have been applied to the process of scutching. The next process is hatchelling or carding. As performed by hand, a wisp of flax, held in the middle and well spread out, is thrown so as to draw one end of it over a set of sharp steel teeth which are set upright and serve the purpose of a comb. One end of the bundle being hatchelled, it is turned round, and the other is treated in the same way; and the process is repeated on finer hatchels. By this means about 50 per cent. of tow and dust and woody particles are separated from the long fibre, now called line. This is fit for spinning into linen threads, and the tow may be used for the same purpose for coarser fabrics. Machine hatchelling, however, has for the most part taken the place of hand labor, and is conducted upon a large scale and with many modifications in the extensive linen mills. The flax, being cut in lengths of 10 or 12 inches, is arranged in flat layers called sticks, the fibres parallel and ending together. Each of these is held by two strips of wood clamped together across its middle, or sometimes across one end. They are placed around a revolving drum, within which another drum armed with teeth rapidly revolves in a contrary direction, and combs the flax as the ends fall among the teeth. When hatchelled on one side, the strick is turned over and the process is repeated on the other. The outer drum revolves slowly, and discharges the sticks when they have been carried over the top of the inner drum, beyond the point where the fibres could no longer fall among the teeth. Much ingenuity is displayed in the modifications of this machinery, and also of a preparatory machine for dividing the fibres into equal lengths and sorting the lower ends, the middles, and the upper ends, each by themselves. The sticks when hatchelled are sorted according to the fineness of the fibres, those made up of the lower ends being the coarsest; the divisions, however, are much more minute than those of each fibre into 3 lengths. In making this separation the line sorter, as the operator is called, is guided entirely by the sense of feeling, this indicating the quality of the fibres more delicately than the sight. The next operation preparatory to spinning is to lay the fibres upon a feeding cloth, each successive wisp overlapping half way the one preceding it. The feeding cloth conveys them to rollers between which they are flattened and held back as a second pair more rapidly revolving seizes the part in advance and draws out the flax. A tape or ribbon of flax is thus formed, which is discharged into a tin cylinder, a row of which stands upon the floor in front of

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the machines. The tapes or slivers are afterward joined several together, and at the roving frame are slightly twisted, when they are wound upon bobbins, which is the last process before spinning. (See LINEN.)—The principal treatise upon this subject is the prize essay of James MacAdam, jr., secretary to the society for the promotion and improvement of the growth of flax in Ireland. The prize was awarded to it by the royal agricultural society of England, and the essay was published in vol. viii. of their "Journal." It has furnished a great part of the data of many of the valuable papers published in the English scientific dictionaries already referred to.

FLAXMAN, JOHN, an English sculptor, born in York, July 6, 1755, died in London, Dec. 7, 1826. In the workshop of his father, a moulder of figures, who had established himself in London, he acquired his first ideas of form. Being a boy of delicate health, he was allowed to follow his own tastes, and showing a strong inclination for modelling, he was placed at the royal academy. After many years of severe study, during which he supported himself by designing for the Wedgwoods and others, and produced some meritorious works, including a monument to the poet Collins, he went in 1787 to Rome. He had previously read the Greek poets in the original, and soon testified his sense of their beauty and of the purity of antique art by his two series of outline illustrations of Homer and Æschylus, by which he is perhaps more widely known than by any of his other works. A series of illustrations of Dante, almost equally celebrated, was subsequently executed for Mr. Thomas Hope. After 7 years' sojourn in Rome he returned to England, and commenced a series of scriptural compositions, remarkable for religious fervor and pathos. Of the numerous statues which he executed, those of Nelson, Howe, Sir Joshua Reynolds, Mansfield, and Kemble are the best known. His "Shield of Achilles" is one of the finest achievements of modern art. Flaxman was a member of the royal academy, in which he also filled the chair of professor of sculpture, to which he was appointed in 1810.

FLEA. See EPIZOA.

FLÉCHIER, ESPRIT, a French pulpit orator and prelate, who was called the Isocrates of France, born in Pernes, June 10, 1632, died in Montpellier, Feb. 16, 1710. Of a poor family, he was educated at Avignon, in the college of the "Fathers of the Christian Doctrine," of which his maternal uncle was superior. He gave special attention to the culture of eloquence, was noted for the elegance of his language, taught rhetoric for a time at Narbonne, and in 1661 repaired to Paris, where without fortune or friends he became catechist in a parish. A Latin poem which he wrote describing the famous tournament celebrated by Louis XIV. in 1662 was much admired, and he soon after became preceptor in the house of Caumartin, a councillor of state, made distinguished friends by his graceful language and polished manners, and was admitted into the society of the hotel de Rambouillet. Devoting himself to preaching, many of his sermons were highly esteemed, but his funeral oration on the duchess of Montansier in 1672 was his first great triumph. His funeral oration on Turenne, delivered in Paris in 1676, was a masterpiece of art, and placed him, in the opinion of many of his contemporaries, by the side even of Bossuet. Among his other funeral orations, those on the first president Lamoignon, on Queen Maria Theresa, and on the chancellor Le Tellier, were most admired. From the time when he was recognized as an honor to the church and to letters he was rewarded by Louis XIV., first with the abbey of Saint Severin, then with the position of reader to the dauphin, with the bishopric of Lavaur in 1685, and with that of Nimes in 1687. He had been admitted into the French academy in 1673 at the same time with Racine. The edict of Nantes having been revoked just before the appointment of Fléchier to his last diocese, which contained numerous Protestants, he found great difficulty in the ecclesiastical government of it. His conduct, however, made him equally dear to the Catholics and Protestants of the province, who united in mourning his death. Beside his funeral orations, he left *Panégyriques des saints*, in 3 volumes; *Vie de Théodose le Grand*, composed for the education of the danphin; and *L'histoire du cardinal Ximenès*, in which the minister and politician are forgotten in the portrait of the saint. The charity and amiability of Fléchier appear especially in his letters, which are composed with the same care as his other productions.

FLECKNOE, RICHARD, a British poet, contemporary with Dryden, died about 1678. Little is known of his life, and he is remembered only because his name furnished Dryden the title of his satirical poem against Shadwell, "MacFlecknoe." He is believed to have been an Irish Catholic priest, and wrote several comic plays, among which are "Damoiselles à la Mode," "Love's Dominion," and "Ermina, or the Chaste Lady." He wrote also a volume of "Epigrams and Enigmatic Characters." His poems are of little value, though some of them have been praised by Southey.

FLEETWOOD, CHARLES, an English republican, son of Sir William Fleetwood, died in 1692. At the commencement of the civil war he enlisted as a trooper in the parliamentary army, and in 1645 rose to the rank of colonel, and was appointed governor of Bristol. In the same year he was returned to parliament for Buckinghamshire, and in 1647 he was named one of the commissioners to treat with the king. After the establishment of the commonwealth he was appointed lieutenant-general, distinguished himself at the battle of Worcester, and, in consequence of his great influence with the army, after the death of his first wife, Cromwell gave him his eldest daughter, the widow of Ireton, in marriage. In 1652

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he was appointed commander-in-chief of the forces in Ireland, and afterward lord deputy; but his opposition to the ambitious projects of his father-in-law soon caused him to be recalled to England. He was however subsequently appointed one of the major-generals to whom the internal government of the country was committed during the latter days of the protectorate. On the death of the protector he endeavored by his influence with the troops to supplant Richard Cromwell, but in the midst of his intrigues the Stuarts were restored, and he narrowly escaped being executed as a rebel. He retired to Stoke-Newington, and passed the rest of his life in obscurity. He is described as a man of slender capacity, cunning, timid, and irresolute, with but little military skill.

FLEMING, a N. E. co. of Ky., bounded S. W. by Licking river, and intersected by the Lexington and Maysville railroad; area estimated at 500 sq. m.; pop. in 1850, 13,916, of whom 2,139 were slaves. It has a diversified surface, the E. part being hilly and the W. undulating. The soil is generally good, and suitable for grain and hemp. In 1850 the county produced 926,708 bushels of Indian corn, 105,854 of oats, 52,283 of wheat, and 4,500 lbs. of wool. There were 33 churches, and 1,063 pupils attending public schools. Near Licking river is found a remarkable deposit of iron fulgurites, the oxide being formed into regular tubes of various diameters, from that of a pistol barrel to several inches. The county was organized in 1798, and named in honor of Col. John Fleming, one of the pioneer settlers of the state. Capital, Flemingsburg.

FLEMING, John, a Scottish naturalist, born at Kirkroads, near Bathgate, Linlithgowshire, in 1785, died in Edinburgh, Nov. 18, 1857. Although possessing in his youth an unusual taste for the natural sciences, he yielded to the desire of his mother that he should look to the ministry as a profession, and about 1807 was licensed as a preacher in connection with the church of Scotland. He did not, however, neglect the interests of science, and in 1808, while engaged in a survey of the economical mineralogy of the western isles, so won the regards of the members of the presbytery of Lerwick that he received the offer of the living of Bressay in Shetland, over which congregation he was ordained in the same year. About the same time appeared his "Economical Mineralogy of the Orkney and Zetland Islands," considered in many respects a remarkable performance for a young man of 23; and thenceforth for nearly 30 years his attention was pretty equally divided between the duties appertaining to his office and his scientific pursuits. In 1810 he exchanged the remote living of Bressay for that of Flisk, in Fifeshire, contiguous to which was the parish of Kilmany, over which Dr. Chalmers was settled, between whom and himself a lasting friendship was soon established. His contributions to public journals and to learned societies now became frequent, and before he had attained the age of 30 his reputation as a zoologist was second to that of no other naturalist in Scotland. In 1822, having previously furnished the article "Ichthyology" for the "Encyclopædia Britannica," and those on "Helminthology" and "Insecta" for the "Edinburgh Encyclopædia," beside numerous papers for the "Proceedings" of the Wernerian society and the royal society of Edinburgh, and the "Edinburgh Philosophical Journal," he published his first important work, the "Philosophy of Zoology" (2 vols., Edinburgh), in which were embodied the matured thoughts of many years. In the 2d volume he enunciated a system of classification at variance with those of Linnæus and Cuvier, and known as the binary or dichotomous system, the leading feature of which consists in arranging animals according to their positive and negative characters. The publication of his "History of British Animals" (Edinburgh, 1828), in which the first decided attempt was made by a British naturalist to exhibit the palæontological history of animals, by the side of those belonging to our epoch, added to his scientific fame. The subject had occupied the author's attention since boyhood, and the scientific value of his work is exemplified by the frequent references to it in treatises in various departments of zoology and palæontology. The great principle laid down by him, and one from which he never receded, is that the revolutions which have taken place in the animal kingdom have been produced by the changes which accompanied the successive depositions of the strata. Although a rearrangement of some portions of the work is necessary in order to bring it up to the present scientific point of view, the late Prof. Forbes of Edinburgh asserted so recently as 1848 that it had been "his text book and constant companion, and upon it all his knowledge of British animals had been based." In 1832 he was presented to the parish of Clackmannan, but had scarcely entered upon his new sphere of labor when he received an offer to fill the chair of natural philosophy at King's college, Aberdeen, which he accepted, notwithstanding the male communicants of his parish to the number of 418 united in urging him to remain with them. He discharged the duties of this office with much acceptance until 1843, when, having identified himself with the Free church, he found himself obliged to retire from his professorship. Two years later he was asked to take the chair of natural science in the New (Free church) college, Edinburgh, with which he remained connected until his death. In addition to the works enumerated, Dr. Fleming published "Molluscous Animals, including Shell Fish" (Edinburgh, 1837), "The Temperature of the Seasons" (1851), "The Lithology of Edinburgh" (1858), and considerably more than a hundred papers, principally on zoology, palæontology, and geology, nearly every one of which contains a record of some original observation, his aim through life having been to interpret nature strictly and to avoid hypotheses. His

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contemporaries, the most eminent of whom consulted him in various branches of zoology and geology, bear testimony to the comprehensiveness and precision of his information. Prof. Agassiz says "that he should have been abundantly recompensed for his visit to England had he gained no more by it than what he saw and learned during his few hours' visit to Dr. Fleming."

FLEMISH LANGUAGE AND LITERATURE. The *Vlämisch* or *Duytsch*, one of the many Teutonic dialects, is the vernacular of the Vlamingen (about 2,200,000) in the Belgian provinces of E. and W. Flanders, Antwerp, and Limburg, in North Brabant, Holland, as well as in some parts of the French department of Nord, and also scattered in the Wallonic (Gallo-Romanic) provinces of Belgium; French also being spoken in the large cities and used in official documents. It is akin to the Frisian and to the Hollandish or Dutch, which is its younger branch. Goropus Becanus (1569) said that Adam spoke Flemish in paradise. It is more palatal and nasal than the language of Holland, which is more guttural; but the differences are not essential. The first monument of Flemish literature is an ordinance of the dukes Henry I. and II. of Brabant (1229). The *Rymbybel* (Bible in rhymes) and the *Spiegel historical* (Historic Mirror) of Jacob van Maerlant (born in 1235), the civic laws of Antwerp (1300), the chronicle of J. van Clere and many others, a translation of Boethius by Jacob Velt of Bruges of the 15th century, and the "Hive of the Catholic Church" by Philip van Marnix (1569), are the most remarkable among the earlier Flemish works. Many French forms of speech were introduced during the Burgundian reign, and also many Hollandish during the sway of the Hapsburgs. Since the independence of Belgium (1830) great efforts have been made to promote Flemish literature. Among the most prominent writers are: Van Ryswyck, Ledeganck, Rense, Van Duyse, F. Blieck, Serrure, the abbé David, Bormans, Snellaert, Lebrocquy, and Conscience. —See Vandenbossche, *Nouvelle grammaire raisonnée pour apprendre le flamand et le hollandais* (Lille, 1825); J. Desroches, *Grammaire flamande* (Antwerp, 1826); the grammars of Van Beers and Van Heremans; Noel de Berlemont, *Vocabulaire françois et flameng* (Antwerp, 1511); Plautin, *Thesaurus Teutonicæ Linguæ*, perfected by C. Kilian (Antwerp, 1573); Corleva, *Trésor de la langue flamande* (Amsterdam, 1741); Halma, *Grand dictionnaire françois et flamand* (Leyden, 1778); Desroches, *Nouveau dictionnaire français-flamand et flamand-français* (Ghent, 1805); Olinger, *Nouveau dictionnaire français-flamand* (Malines, 1834). Sleecx on the "History and Relations of the Flemish to other Languages" may also be consulted.

FLENSBORG, or FLENSBURG (Lat. *Flenopolis*), a seaport and market town of Denmark, in the duchy of Schleswig, at the head of Flensborg fiord (an inlet of the Baltic, 20 m. long, from 2 to 10 m. broad, and from 5 to 12 fathoms deep), 20 m. N. N. W. of Schleswig; lat 54° 46′ N., long. 9° 26′ E.; pop. 16,500. After Copenhagen, it is the chief commercial mart of the Danish dominions. It manufactures sugar, tobacco, paper, soap, and iron, has breweries and distilleries, and builds ships for the West India trade. A railway connects it with Tonning, and another with Altona, Rendsborg, and Schleswig. The harbor is deep enough for large craft, but is difficult of entrance. Between 200 and 300 vessels, many of which are employed in the Greenland whale fishery, are owned here. Flensborg was a wealthy town as early as the 12th century, but it afterward suffered much from wars and conflagrations. In 1848 it was occupied by the Germans, in 1849 by the Swedes, and restored to Denmark in 1850.

FLETCHER, ANDREW (commonly called Fletcher of Saltoun), a Scottish statesman and author, born in Saltoun, East Lothian, in 1653, died in London in 1716. He was educated under the care of Gilbert Burnet, then minister of the parish of Saltoun, and spent several years in travels on the continent. In 1681 he obtained a seat in the Scottish parliament for his native county, and distinguished himself by his inflexible opposition to the tyrannical tendencies of the English government. He soon found it necessary to withdraw to Holland, was then summoned before the privy council at Edinburgh, and failing to appear, was outlawed, and his estate confiscated. He accompanied the unfortunate expedition of the duke of Monmouth to England in 1685, but went immediately abroad again in consequence of shooting the mayor of Lyme-Regis in a scuffle. In Spain he was imprisoned, but escaped by the aid of an unknown friend, and in Hungary he gained distinction as a volunteer in the army against the Turks. At the Hague he was prominent in forwarding the scheme of the revolution of 1688, which restored him to his country. He soon recovered his estate and resumed his seat in the Scottish parliament, but became as vehement an opponent of the government of William as he had been of that of his two predecessors. He exerted himself to the last against the union of the two kingdoms, and because the 12 "limitations" which he proposed failed to be adopted, he retired from public life. Though the most honest, fearless, and uncompromising republican of his time, he yet, says Macaulay, hated both democracy and monarchy. Proud of his descent from an ancient Norman house, his favorite project was to make Scotland an oligarchical republic, in which the king was to be a mere pageant, and the lowest class of the people bondsmen. He possessed fine scholarly accomplishments, and his writings sometimes display a high degree of literary excellence. The principal of them are: a "Discourse of Government with Relation to Militias" (Edinburgh, 1698); two "Discourses Concerning the Affairs of Scotland" (Edinburgh, 1698); *Discorso delle cose di Spagna* (Naples, 1698); "Speeches," &c. (Edinburgh, 1703); and an "Account of a Conversation

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concerning a Right Regulation of Governments for the Common Good of Mankind" (Edinburgh, 1704). His collected writings were published at London in 1 vol. 8vo. in 1737, and an essay on his life and writings, by the earl of Buchan, in 1797.

FLETCHER, Giles, an English poet, cousin of Fletcher the dramatist, born about 1580, died in Alderton, Suffolkshire, in 1623. He was educated at Trinity college, Cambridge, and became rector of Alderton, where his life passed with little variety of incident. The single poem which he left, entitled "Christ's Victory and Triumph" (Cambridge, 1610), possesses peculiar and original beauties, with many of Spenser's characteristics.—Phineas, brother of the preceding, a poet and clergyman, born about 1584, died in Hilgay, Norfolk, in 1650. After being educated at Eton and Cambridge, he was presented in 1621 to the living of Hilgay, which he retained till his death. He wrote "Piscatory Eclogues," and a drama called "Sicelides," but his chief work is a poem entitled the "Purple Island," an anatomical and allegorical description of the human body and mind. Both of these brothers were disciples of Spenser, and influenced the style of Milton. "They were endowed," says Hallam, "with minds eminently poetical, and not inferior in imagination to any of their contemporaries. But an injudicious taste, and an excessive fondness for a style which the public was rapidly abandoning, that of allegorical personification, prevented their powers from being effectively displayed."

FLETCHER, John, an English dramatic poet, the associate of Francis Beaumont in authorship, born in 1576, died by the plague in 1625. His father, Dr. Richard Fletcher, was successively bishop of Bristol, Worcester, and London. He was educated at Cambridge, and may have first met Beaumont, who was 10 years his junior and whom he survived about 10 years, at the famous Mermaid club, the members of which "used to leave an air behind them sufficient to make the two next companies witty." Their connection was singularly close, and they are said to have lived in the same house and to have had many of their possessions in common. Of the 32 plays published under their joint names, it is probable that Beaumont shared in the writing of only 17; but those which are assigned wholly to Fletcher are fully equal to their common productions. It has however been generally believed that Beaumont furnished the plots, and by his graver judgment and more correct taste controlled the exuberant vivacity and wit of Fletcher, who after the former's death is said to have consulted Shirley on those points. Their plays, though praised for their chasteness by contemporary critics, frequently contain, in the midst of passages of great beauty, others of a coarseness and obscenity highly offensive to modern taste. Dryden was of opinion that they understood and imitated the conversation of gentlemen much better than Shakespeare. The last and one of the best of Fletcher's plays, the "Two Noble Kinsmen," which according to the title page of the earliest edition (1634) was "written by the memorable worthies of their times, Mr. John Fletcher and Mr. William Shakespeare," has long exercised the ingenuity of critics, and it is not agreed that Shakespeare had any share in it, though Dyce ascribes to him the whole of the 1st and parts of the 3d and 5th acts. The first complete collection of Beaumont and Fletcher's works appeared in 1679. An edition by Weber was published in 1812 (14 vols. 8vo., London), and one by Dyce in 1843 (11 vols. 8vo). An edition was published in Boston in 1854 (2 vols. royal 8vo). A judicious selection, by Leigh Hunt, forms a volume of Bohn's "Standard Library."

FLETCHER, John William, an English clergyman and author, born in Nyon, Switzerland, Sept. 12, 1729, died in Madeley, England, Aug. 14, 1785. His original name was De la Flechère, which was Anglicized to Fletcher. He studied at the university of Geneva, and afterward, contrary to the wishes of his parents, who designed him for the ministry, went to Lisbon, and entered the Portuguese army. But a few days before embarking for a distant post whither he had been detailed, he was disabled by an accident, and the ship sailed without him. The vessel was never heard of afterward, and was supposed to have perished at sea. Fletcher returned to Geneva, accepted a commission in the Dutch army, and immediately set out for Flanders; but before reaching this post the war was closed by the peace of Aix la Chapelle. He then directed his steps to England, where he commenced the study of the English language, and was soon able to speak and write it with remarkable purity. In 1757 he was inducted into the ministry, being ordained deacon, and soon after a presbyter of the church of England by the bishop of Bangor, in the chapel royal at St. James's. His first religious exercise after ordination was to assist Wesley in administering the sacrament at West street chapel. Having been for several years a tutor in the family of Mr. Hill of Shropshire, he was, as a testimony of respect, presented by that gentleman with the living of Madeley. He had offered him the living of Dunham, a parish in which, according to Mr. Hill's statement, the "duty was light and the income good;" but he declined to accept it, remarking that "it would not suit him, as there was too much money and too little labor." In his obscure parish Fletcher labored with untiring zeal and devotion; but his labors were attended with the greatest discouragement, for never, perhaps, had pastor a more dissolute and intractable flock. He frequently corresponded with John and Charles Wesley, and also with Whitefield, from whom he received greater sympathy than from any clergymen of the establishment. In 1770 he visited Italy, and on his return he preached at the place of his birth to vast crowds. In 1768 he was chosen by Lady Huntingdon president of

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a theological institution which she had founded at Troveca in Wales. His connection with this institution involved him in a defence of Arminianism, which resulted in an elaborate work on the subject. All the time he was connected with this school of theology he sustained his pastoral relation to Madeley, and hence he was enabled to serve the former gratuitously. He visited Italy again for the benefit of his health, and before returning to England spent 3 years in Switzerland. An edition of his works, in 8 vols. 12mo., appeared in London in 1803. His writings have been often reprinted.

FLEURUS, a town of Belgium, near the left bank of the Sambre, 7 m. N. E. of Charleroi; pop. 3,297. It has been the scene of 4 great battles; the first took place Aug. 30, 1622, between the Spaniards under Gonzales of Cordova and the army of the Protestant union, under Mansfield, the victory being claimed by both; the 2d, July 1, 1690, between the French under Marshal Luxembourg, and the Germans under the prince of Waldeck, the latter being defeated; the 3d was fought June 26, 1794, when the republican French general Jourdan defeated the imperialists under the prince of Coburg; and the 4th, generally known as the battle of Ligny, in which Blücher was worsted by Napoleon, occurred June 16, 1815, 2 days before the battle of Waterloo.

FLEURY, André Hercule, cardinal de, a French prelate and statesman, born in Lodève, June 22, 1653, died in Paris, Jan. 29, 1743. He was educated at a Jesuit college in Paris, and by the aid of influential friends secured the appointment of almoner to the queen Marie Thérèse, then to Louis XIV., who unwillingly promoted him to the bishopric of Fréjus in 1698, at the request of the archbishop of Paris. On the king's death the regent appointed him preceptor to Louis XV., then about 5 years of age. On the death of the regent in 1723 he advised the young king to take the duke of Bourbon as first minister, reserving for himself a seat in the privy council, and the dispensation of ecclesiastical preferments. In 1726 he caused the duke of Bourbon to be dismissed, and, notwithstanding he was himself in his 73d year, assumed supreme power, with the title of minister of state, and superintendent of the general post office. In the same year the pope made him a cardinal. Under his administration France was generally at peace, the disorders of the past reign disappeared, reforms were made in the government, arts and sciences were fostered, and the country enjoyed comparative prosperity at home. But abroad she lost the high place she had held in the councils of Europe, her army degenerated, her navy decayed, and toward the close of his life the cardinal had the chagrin of hearing himself charged with involving France in the war of the Austrian succession, which had been begun against his wishes, and up to the time of his death had been little more than a series of disasters for his country. He sought to introduce into the public administration the same frugality which he practised in his own household; and with all his opportunities for self-emolument, he died poor. In a less exalted station Cardinal Fleury would have left a greater name. He loved peace more than power, and, without the broad views and active spirit of a great statesman, looked with an uneasiness akin to apprehension upon those bolder characters who might have supplied his own deficiencies.

FLEURY, Claude, abbé, a French ecclesiastical writer, born in Paris, Dec. 6, 1640, died July 14, 1723. He was at first an attorney, and for 9 years followed the legal profession, giving meanwhile great attention to literary and historical pursuits. His acquaintance with Bossuet, Bourdaloue, and several other clergymen of high character, probably turned his mind toward the church. In 1672, having received orders, he became, on the recommendation of Bossuet, preceptor to the sons of the prince de Conti. In 1674 he published *L'histoire du droit Français;* in 1677, *L'institution au droit ecclésiastique;* in 1678, a Latin translation of Bossuet's *Exposition de la foi Catholique;* and from 1681 to 1683, *Les mœurs des Israélites, les mœurs des Chrétiens,* and *Le grand catéchisme historique,* 3 excellent little books which he had carefully prepared for the use of his pupils. In 1685 he accompanied Fénélon in his mission to Saintonge, and evinced here true Christian charity. In 1689 Fénélon procured his appointment as his assistant in the education of the dauphin's son, which task he fulfilled with the utmost zeal and devotion. In this employment he remained 16 years, during which he was also engaged in preparing his great *Histoire ecclésiastique,* the first volume of which appeared in 1691. He spent no less than 30 years in bringing this work down to the beginning of the 16th century. In 1684 Fleury received the abbacy of Loc-Dieu, which in 1706 he resigned on receiving a priory at Argenteuil. In 1696 he was elected to the French academy to succeed La Bruyère. He always lived with evangelical simplicity. He was a fluent writer and a faithful historian. His *Histoire ecclésiastique* ranks among the best and most candid histories of Christianity.

FLINDERS, Matthew, an English navigator, born in Donington, Lincolnshire, in 1760, died in July, 1814. In 1795 he was midshipman on board the vessel which conveyed Capt. Hunter, the governor of Botany Bay, to Australia. Soon after arriving in Port Jackson he embarked with the surgeon of the ship, George A. Bass, in a small boat, not more than 8 feet long, in which they explored the estuary of George's river. The discoveries made by them on this occasion determined them to explore the whole Australian coast. They embarked in a large decked boat with only 6 men, and sailing S. through a passage afterward named Bass's straits, first discovered that Van Diemen's Land was a separate island. In July, 1801, Flinders, now a captain, again sailed from England, sur-

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veyed the whole Australian coast as far as the eastern extremity of Bass's straits, then proceeded to Port Jackson, where he refitted, and in the summer of 1802, steering N., explored Northumberland and Cumberland islands, and surveyed the Great Barrier reef of coral rocks. While attempting to make his way back to England he was seized by the governor of the Isle of France, in spite of a French passport, and detained a prisoner for 6 years; after which his health was so impaired, and his spirit so broken, that he expired in London on the day when the narrative of his discoveries and adventures was published ("Voyage to Terra Australis, &c., in the years 1801, '2, and '3," 2 vols. 4to., London, 1814).

FLINT, a variety of the mineral species quartz, of dull colors, frequently black, of conchoidal fracture, easily broken into splintery fragments, which from the sharpness and hardness of their edges are well adapted for striking fire with steel. Beside silica, flint contains about one per cent. of water, and one per cent. divided among lime, oxide of iron, and alumina. Berzelius also detected potash in its composition. Its hardness slightly exceeds that of pure quartz. It is remarkable for the facility with which, when freshly quarried, it is broken by the hammer in any direction. By this property the thin gun flints are fashioned with great rapidity, the workmen breaking up the rough nodules as they are extracted from their repositories in the chalk beds, and chipping off with a pointed hammer from the rough lumps scales which, being skilfully applied upon the edge of a chisel set upright in a block of wood and struck, are converted with wonderful precision into their peculiar form. After the flints have been long quarried, their facility of being thus accurately worked is lost. So great skill was attained in the manufacture of gun flints before the introduction of percussion caps, that a workman could with his hammer and chisel produce 1,000 well formed flints in 3 days. But the flint must be of good quality, of uniform grain and color, and so translucent that letters may be read through a slice $\frac{1}{10}$ of an inch thick. The colors preferred are from a honey yellow to blackish brown. Flint is found so abundantly in the chalk formation in England, that it has been applied to purposes which are served here by better materials. It was formerly thought an essential article in the production of flint glass, but is now superseded by pure granular quartz or sand. It still continues to be used in the manufacture of porcelain; and the rough nodules are found to be well adapted for the construction of substantial walls of masonry, as may be seen in the counties of Kent, Suffolk, and Norfolk, England. These nodules constitute a peculiar feature in the chalk cliffs of the coast of England. They occur in horizontal layers scattered through the upper portion of the chalk formation, and in a few instances, as noticed by Lyell, have been seen in vertical rows like pillars, at irregular distances from each other, the nodules not being in contact either in the horizontal or vertical arrangement. They commonly contain a nucleus of parts of marine fossils, such as are abundant in the chalk, as shells, sponges, echini, &c.; and they also present the forms of hollow geodes, their cavities lined with quartz crystals, iron pyrites, carbonate of iron, chalcedony, &c.—Flint is a common mineral production in the United States, but it is converted to no use. It abounds in the tertiary formations of the southern states, and is met with in the older rocks, even to the metamorphic quartz associated with the lowest stratified rocks. Upon the Lehigh mountain in Pennsylvania, at Leiber's Gap, is exposed in loose fragments in the soil a vast amount of flint rock, associated with cherty quartz incrusted with chalcedony and mammillary and botryoidal crystallizations. In the woods west of the road some 20 acres of surface have in ancient times been dug over by the Indians, their object being to obtain the flint for arrow and spear heads. Piles of broken flint still lie uncovered by the sides of the excavations, which remain unfilled. The stone was evidently highly prized by them, and they certainly possessed great skill in fashioning it into the forms they required.

FLINT, a village and township on Flint river, and the capital of Genesee co., Mich.; pop. in 1853, about 2,000. It is surrounded by a fertile country, possesses abundance of water power, and has an active trade. It is the seat of the Michigan asylum for the deaf, dumb, and blind, and contains a U. S. land office and 2 newspaper establishments.

FLINT, Timothy, an American clergyman and author, born in North Reading, Mass., in July, 1780, died in Salem, Aug. 16, 1840. He was graduated at Harvard college in 1800, and having entered the ministry of the Congregational church, was settled at Lunenburg, Mass., in 1802. He was a diligent student of the natural sciences, and his chemical experiments led some ignorant persons to charge him with counterfeiting coin. He prosecuted them for slander; an ill feeling increased by political differences sprang up between him and his parishioners, and he consequently resigned his charge in 1814. He then preached in various parts of New England, and in Sept. 1815, set out for the West as a missionary. He passed 7 or 8 years in this capacity in the Ohio and Mississippi valleys, but losing his health tried to unite the avocations of farmer and school teacher, at first near New Orleans and afterward on Red river. In 1825 he returned to Massachusetts, broken in health and fortune; but the change of climate soon restored the former, and he turned to literary pursuits to repair the latter. His first work was "Recollections of Ten Years passed in the Valley of the Mississippi" (8vo., Boston, 1826), which was favorably received in America and England, reprinted in London, and translated into French. In the same year he brought out a novel, "Francis Berrian, or the Mexican Patriot." His next

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publication was a "Condensed Geography and History of the Western States in the Mississippi Valley" (2 vols. 8vo., Cincinnati, 1828), forming, with the "Recollections," one of the best accounts of that region ever written. In 1828 he removed to Cincinnati, where he edited for 3 years the "Western Review." In 1833 he went to New York and conducted a few numbers of the "Knickerbocker Magazine." He afterward took up his residence in Alexandria, Va., spending most of his summers in New England. His writings are spirited and powerful, but somewhat wanting in polish. His principal works, beside those mentioned above, are: "Arthur Clenning," a novel (2 vols. 12mo., Philadelphia, 1828); "George Mason, or the Backwoodsman;" "Shoshonee Valley" (2 vols. 12mo., Cincinnati, 1830); a translation of Droz, *Essai sur l'art d'être heureux* (Boston, 1832); "Indian Wars in the West" (12mo., 1833); "Lectures on Natural History, Geology, Chemistry, and the Arts" (12mo., Boston, 1833); "Memoir of Daniel Boone" (18mo., Cincinnati, 1834). He also contributed to the London "Athenæum" in 1835 a series of papers on American literature.

FLINT RIVER (Indian name, *Thronateeska*), a river of Georgia, rising in the W. part of the state, near Fayetteville, flowing S., and uniting with the Chattahoochee at the S. W. extremity of the state, to form the Appalachicola. It is about 300 m. long, and is navigable as far as Albany, a distance of 250 m. from the gulf of Mexico. Principal towns on its banks, Lanier, Oglethorpe, and Albany.

FLINTSHIRE, a N. E. co. of Wales, consisting of 2 separate portions, lying at a distance of 8 miles from each other, with a part of Denbighshire between them, the larger portion bordering on the Irish sea and the estuary of the Dee; aggregate area, 289 sq. m.; pop. in 1851, 68,156. It is the smallest but most populous county in Wales. The surface near the coast is low, and elsewhere is diversified, though there are no great elevations. A range of hills runs alongside the S. W. boundary, and sends off a branch which traverses the county in a N. E. direction. Between these ridges are fertile valleys, including the well known vale of Clwyd, watered by several rivers, which flow on the one side into the Clwyd and Alyn, and on the other into the Dee, which forms the N. E. boundary. The greater part of the county rests upon the coal measures, which exist chiefly on the coast of the estuary of the Dee. Lead mines, the ore from which also yields a little silver, are worked near Holywell and Bagillt, and are esteemed the richest in the kingdom. The other minerals are copper, iron, zinc, and calamine. Agriculture employs about 8 per cent. of the population. The shipping trade is not extensive, as the ports are accessible only by small craft. The Chester and Holyhead railway traverses the county, and the Chester and Mold railway penetrates to its centre. The chief towns are Mold, the capital, Flint, St. Asaph, Holywell, Rhyddlan, Hawarden, and Bagillt. One member is returned to the house of commons for the county, and one for the town of Flint.

FLOATING ISLANDS. An early notice of this phenomenon is recorded in an interesting letter of the younger Pliny to Gallus, in which he describes the appearance of a number of them he had observed in the lake Vadimon, now Laghetto di Bassano, near Rome. They were covered with reeds and rushes, and were of such consistence, that the sheep grazing upon the borders of the lake passed upon them to feed, and were often floated away from the shore. Upon the lake Gerdau, in Prussia, the extent of such islands is said to be sufficient for the pasturage of 100 head of cattle; and on one in the lake Kolk, in Osnabrück, fine elms are said to grow. These islands are produced by accumulations of drift wood, among which drifting sands and earth collect and form a soil, in which plants take root and flourish, sometimes becoming trees. The great "rafts" of some of the western rivers are of this nature, though for the most part these do not float from place to place. Masses are occasionally detached, however, and drifted out from the mouth of the Mississippi, carrying with them into the gulf the birds, serpents, and alligators that had taken refuge upon them. Such islands have been seen floating 100 miles off from the mouth of the Ganges, from which they had been discharged. Upon the great rivers of South America they are very often met with, carrying with them the prolific productions of the vegetable and animal life of the tropics, to deposit them in new localities. Thus they may have been the means of distributing species of the larger animals among the islands of the South Pacific, upon many of which their introduction by any other mode is difficult to account for. Prescott describes the floating gardens or *chinampas* of Mexico as an archipelago of wandering islands. The primitive Aztecs adopted the plan suggested by these natural objects, and attaching the reeds and rushes together, they covered the raft thus formed with the fertile sediment drawn up from the lake. Upon these gardens, gradually extended to 200 or 300 feet in length, the Indians cultivated flowers and vegetables for the market of Tenochtitlan. Some of the *chinampas* were even firm enough to sustain small trees and a hut, and could then be moved about with a pole or remain anchored by the same.

FLODDEN FIELD, Battle of, fought Sept. 9, 1513, between the Scots under King James IV. and the English under the earl of Surrey. Henry VIII. was on the continent engaged in his expedition against France when the border feuds between England and Scotland broke into open war, and, according to Scott, "prudence, policy, the prodigies of superstition, and the advice of his most experienced counsellors, were alike unable to subdue in James the blazing zeal of romantic chivalry." He crossed the Tweed, Aug. 22. at the head of the feudal array of his

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kingdom, captured 4 border fortresses, and encamped, Sept. 6, on Flodden, the last of the Cheviot hills, in the county of Northumberland, 8 miles S. E. of Coldstream. The earl of Surrey, to whom was intrusted the defence of the English border, summoned the gentlemen of the northern counties to join him at Newcastle, where he set up his standard, and reached Alnwick Sept. 3, with 26,000 men, where, according to the practice of chivalry, he offered battle to James in a message sent by a pursuivant-at-arms. By a skilful countermarch he placed himself, on the morning of Sept. 9, between James and his own country, so that

> The English line stretched east and west,
> And southward were their faces set;
> The Scottish northward proudly prest,
> And manfully their foes they met.

The battle began between 4 and 5 o'clock P. M., and was decided in little more than an hour. The Scottish army, setting fire to its tents, descended the ridge of Flodden to secure the eminence of Brankstone, and was met by the English army, which advanced in 4 divisions under the command of Surrey, his 2 sons, Thomas and Sir Edmund Howard, and Sir Edward Stanley. Earls Huntley and Home, who led the Scottish left wing, charged the Howards so successfully with a body of spearmen that Sir Edmund was unhorsed and his division put to flight. The battle was restored in this quarter by the advance of Lord Dacre with the reserve of cavalry. On the right wing the highlanders were unable to stand against the severe execution of the Lancashire archers. James, surrounded by some thousands of chosen warriors, charged upon Surrey in the centre of his army with such resolution as to penetrate within a few yards of the royal standard, when he was attacked in the flank and rear by Stanley, already victorious over the Scottish right. James fell by an unknown hand within a lance's length of Surrey, and all of his division perished with their king, not one of them being made prisoner. Before dawn the Scots abandoned the field in disorder. Their loss was about 10,000 men, which included the prime of their nobility, gentry, and even clergy. "Scarce a family of eminence," says Scott, "but had an ancestor killed at Flodden, and there is no province of Scotland, even at this day, where the battle is mentioned without a sensation of terror and sorrow." The English lost about 7,000 men, but of inferior note. Scott's "Marmion, a Tale of Flodden Field," contains, in the last canto, an accurate and most animated description of the battle of Flodden.

FLOOD, Henry, an Irish orator and politician, born in 1732, died Dec. 2, 1791. He was a son of the chief justice of the court of king's bench in Ireland, and was educated first at Trinity college, Dublin, and afterward at Oxford. In 1759 he became a member of the Irish house of commons, where his eloquence made a remarkable impression, and his activity in support of all measures beneficial to his country won him great popularity. His relations to the government, however, exposed him to the charge of inconsistency. He was reëlected to parliament in 1761, and was made a privy councillor for the 2 kingdoms, and vice-treasurer of Ireland in 1775, but resigned in 1781. In 1783 he held the celebrated discussion with Mr. Grattan in the house of commons, which was carried to a degree of bitterness almost unparalleled, and became so personal in its character that Flood was interrupted by the speaker. In the same year he was returned to the English parliament for the city of Winchester, and in 1785 he represented the borough of Seaford. His speeches were logical, pure in style, and rich in figures and classical allusions. He left a Pindaric "Ode to Fame," and a poem on the death of Frederic, prince of Wales, to be found in the Oxford collection. His property was finally bequeathed to Trinity college, Dublin.

FLOOR CLOTH, strong canvas made of flax, with more or less hemp intermixed, covered on both sides with a heavy coating of paint, and printed on one side after the manner of the calico block printing. It is much used for the covering of floors of halls and passages, for which it is well adapted by its durability and cleanliness. Made with picked long flax, it is a good material for covering the roofs of verandahs and light structures. The canvas is prepared of all widths, from a yard to 9 yards, so that an extensive apartment may be covered by a single piece of it. The looms for producing pieces of great width require two men, one on each side for throwing the shuttle forward and back. The length of the pieces sometimes exceeds 100 yards. From these large pieces suitable lengths of 60 to 100 feet are cut off at the painting establishments, and then stretched tightly upon substantial upright wooden frames, a row of which is built up in the frame room, each one separated from the next by a space of a few feet. Ladders and platforms are conveniently arranged to afford access to every part of the surface of the cloth. Being strained and well secured in the frame, the surface is tight like a drumhead, and an increase of dampness may even cause the cloth to split. The first application, which is made to the back of the canvas, is of a solution of glue size, laid on with brushes. This enters the pores of the cloth, and is rubbed smooth, while still damp, with pumice stones. When this is dry, a coating of paint of linseed oil and ochre, or any cheap coloring matter, made with little or no turpentine, and so thick that it cannot be spread with a brush, is laid on with a steel trowel, and well worked into the cloth. In the course of two weeks this becomes dry, so as to be fit for receiving a second coat; and on this, when dry, the private marks of the manufacturer are made. During this time similar operations have been going on upon the face of the cloth, no less than 3 coats of paint being applied with the trowel, and finally a 4th coat is laid on with the brush, which is intended to form the ground of the design to be afterward printed. Each

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coat of trowel color on this side is carefully pumiced, when dry, before the next is laid on. For the best cloth 2 or 3 months are required to complete these operations, and the materials laid on amount to nearly 3 times the weight of the canvas. The heavy pieces are received from the frames upon rollers set upright, the face being protected by a covering of paper, and are then conveyed to the printing room, where they are drawn upon a long table as fast as the printing upon the portions in advance progresses. This is accomplished by blocks of pine, faced with some close wood, as that of the pear tree, and engraved, each one to print all those parts of the pattern which are in one color, the portions corresponding to the other colors being cut away. As many blocks are applied in succession, therefore, as there are colors to be printed, the operation being nearly the same as that described in CALICO PRINTING. The blocks are for the most part heavy, 18 inches square, and when applied are struck several blows with a heavy hammer. When designed to print a broad uniform surface, their face is made by indented lines crossing each other; the paint is taken up more uniformly and is more evenly spread than it would be with a plain surface. As in calico printing, the stock of blocks required to be kept on hand involves the outlay of a large capital. Before applying them to the cloth, the surface of this is roughened with a steel scraper and hard scrubbing brush, that it may better take the color. As fast as the pattern is completed the cloth is moved on, and in some establishments passes through the floor into the drying room, where it is kept for months to thoroughly dry. If drying oils are used, the cloth is likely to be brittle and of inferior quality.—During the present year (1859) a patent has been secured in England for the following method of making ornamental floor cloth. On cloth which has been first printed upon or dyed like calico a transparent ground or coating is put by applying several coats of clarified linseed oil, rendered "drying" in the usual way with sulphate of zinc or acetate of lead. When this transparent coating is dry, it is rubbed smooth with pumice stone, and a hard varnish put on the top, copal varnish being employed for light colors and asphalt varnish for black glazed cloth.

FLORA, the Roman goddess of flowers and spring. She was worshipped in Rome from the very earliest times. Her temple stood near the *circus maximus;* and her festival was celebrated annually on the 3 last days of April.

FLORA, a term corresponding to fauna, indicating the plants belonging to any country, as that does the animals. Its application is extended to the groups of plants, the fossil remains of which are found belonging to any geological formation or period.

FLORENCE, a post village and the capital of Lauderdale co., Alabama, situated at the head of navigation on the Tennessee river, nearly opposite Tuscumbia; pop. in 1853, about 1,500. Though not a place of large population, it is exceedingly prosperous and has an extensive business, being the chief shipping point for the productions not only of the county but of a large part of Tennessee. It is near the line of a railroad connecting it with Arkansas, Tennessee, Mississippi, Georgia, South Carolina, and the northern and middle states. The river is here crossed by a handsome bridge, about ¼ m. long, which cost $150,000. Immediately above it are the Muscle Shoals. Steamboats ascend to this point from the mouth of the Tennessee, a distance of 300 m. In 1850 the village contained 3 large brick churches, the Wesleyan university, a female seminary, 1 newspaper office, and 2 large cotton factories, each having a capital of $45,000.

FLORENCE (Ital. *Firenze*), a celebrated city of Italy, the capital of Tuscany, in lat. 43° 46′ N., long. 11° 16′ E., 182 m. from Genoa, 293 from Turin, 244 from Milan, 186 from Venice, 190 from Rome, and 365 from Naples; pop. in 1858, 114,081. The city lies in a beautiful, well wooded, well cultivated valley, surrounded by the Apennines. It is encircled by an old wall 5 or 6 m. long, with 8 gates. The river Arno flows through it, dividing it into two parts of unequal size, the larger of which is on the right or N. bank. The river within the city is crossed by 4 fine stone bridges, of which the most noted is the *ponte di Santa Trinita*, which was built in 1566–'9. It is adorned with statues, is 323 feet long, and the centre arch has a span of 96 feet. This bridge is a favorite evening walk of the people. The *ponte Vecchio* is 75 feet wide, and the carriage way in the middle is lined on each side by a row of shops occupied chiefly by goldsmiths and jewellers. In the older parts of the city the streets are narrow and irregular, and the houses for the most part meanly built; but the newer and larger portions are very handsome and stately, and the streets wider than is common in the cities of southern Europe, and solidly paved with blocks of stone. The churches of Florence are 170 in number, and many of them of great size, but few are completely finished, and their general appearance is neither elegant nor picturesque. The principal church is the Duomo, or cathedral, a vast and superb structure, which is surpassed in architectural grandeur only by St. Peter's at Rome. Its foundations were laid in 1298; the great dome was erected by Brunelleschi in the 15th century, but the façade was not completed till the middle of the 17th. The length of the building is 454 feet; its greatest breadth is 334 feet; its height from the pavement to the summit of the cross is 389 feet; the height of the nave is 153 feet, and of the side aisles 97 feet. The exterior of the church is covered throughout with red, white, and black marble, disposed in panels and variegated figures; and the pavement is also of many-colored marble, much of which was laid under the direction of Michel Angelo. The dome of this cathedral is the largest in the world, its circumference being greater than that of the dome of St. Peter's, and its comparative

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height greater, though its base is not placed at so high an elevation above the ground. It excited the emulation of Michel Angelo, who endeavored to surpass it in the dome of St. Peter's. This church is richly adorned by statues and pictures, most of which are by eminent masters. Among the statues is an unfinished group by Michel Angelo, representing the entombment of Christ. Among the paintings is a portrait of Dante, executed in 1465. Near the cathedral stands the *campanile* or belfry, which was designed by Giotto, and begun in 1334. It is a square tower, 276 feet high, light and elegant, in the Italian-Gothic style, and divided into 4 lofty stories. Charles V. used to say that it deserved to be kept in a glass case. The lower story contains 2 ranges of tablets, designed by Giotto and executed by him and by Andrea Pisano and Luca della Robbia. Opposite the principal front of the cathedral stands the baptistry, whose 3 great bronze portals adorned with bass-reliefs by Andrea and Ghiberti Pisano were declared by Michel Angelo worthy to be the gates of Paradise. The church of San Lorenzo has attached to it a sacristy which contains 7 statues by Michel Angelo. Adjoining the same church is the costly Medicean chapel, begun in 1604 by Ferdinand I., grand duke of Tuscany, as the mausoleum of his family, on which, it is said, $17,000,000 have been expended. It is an octagon 94 feet in diameter and 200 feet high, and is lined throughout with lapis-lazuli, jasper, onyx, and other precious stones. The church of Santa Croce, a huge edifice 460 feet long and 134 feet wide, whose foundation stone was laid in 1294, is the Pantheon or Westminster abbey of Florence. It contains the tombs of Michel Angelo, Macchiavelli, Galileo, Leonardo Aretino, the historian Gnicciardini, the poet Alfieri, and of many other illustrious men. Florence abounds in palaces of a singularly solid, heavy style of architecture, resembling prisons or fortresses. They were built in ages of turbulence and civil strife, for defence and security rather than for display or luxury. Their great size and height, the rough massiveness of their lower stories, and the huge cornices frowning over their fronts, give them a very impressive appearance. The two principal palaces, the Palazzo Vecchio and the Palazzo Pitti, contain celebrated collections of works of art. The Medicean gallery, built in 1564, contains a number of masterpieces of painting and sculpture, among them the Venus de' Medici, the "Knife-Grinder," the group of "Niobe and her Children," and various paintings by Raphael, Titian, Michel Angelo, and others of the highest eminence. Beside these famous collections, the city abounds in galleries, museums, and choice works of art. There are several large libraries, the Magliabecchian with 150,000 volumes, the Laurentian with 120,000 printed volumes and 6,000 valuable MSS., the library of the Pitti palace with 70,000 volumes, and the Marucellian library with 50,000 volumes. There are many literary institutions, the chief of which is the academy *Della Crusca*, founded in 1582, whose object is the improvement of the Italian language. There are agricultural and fine-art academies, a medical college, and an athenæum. Charitable institutions are numerous, including asylums for the blind, for the deaf and dumb, and for orphans, and an ancient association of the nobles and gentry for the relief of the sick and suffering poor.—The trade of Florence at the present day is chiefly in the produce of the surrounding country, oil, wine, and raw silk, and in her own manufactures, of which the principal are silk stuffs, straw hats, artificial flowers, musical and scientific instruments, jewelry, and fine porcelain. The climate is mild and healthy. The environs are like beautiful gardens, and abound in delightful places for excursions. The people are lively, polite, and intelligent, with a refinement of manner and language which extends even to the lowest classes, whose style of speech is singularly graceful, delicate, and expressive. The climate, the cheapness of living, the galleries of art, and the refinement of the people, render Florence a particularly pleasant place of residence, and have attracted to it great numbers of foreigners, especially English and Americans. Florence is remarkable for the number of its distinguished citizens, among whom have been Dante, Petrarch, Boccaccio, Macchiavelli, Michel Angelo, Leonardo da Vinci, Benvennto Cellini, Galileo, Gnicciardini, Americus Vespucius, Cosmo and Lorenzo de' Medici, and Filicaja, the chief of the lyric poets of Italy. Benjamin Disraeli says of Florence: "You cannot stroll 50 yards, you cannot enter a church or a palace, without being favorably reminded of the power of human thought. In Florence, the monuments are not only of great men, but of the greatest. You do not gaze upon the tomb of an author who is merely a great master of composition, but of one who formed the language. The illustrious astronomer is not the discoverer of a planet, but the revealer of the whole celestial machinery. The artist and the politician are not merely the first sculptors and statesmen of their time, but the inventors of the very art and the very craft in which they excelled."—Florence by the Romans was called Florentia. It is supposed to have been founded by the dictator Sylla, about 80 B. C.; but it seems to have been of little importance till the later ages of the Roman empire. In 405 it was a considerable city, and was besieged by Radagaisus, king of the Goths, at the head of a great army. It was delivered by Stilicho, who raised the siege and captured and put to death the barbarian monarch. In 542 it was laid in ruins by the army of Totila, king of the Ostrogoths. Charlemagne rebuilt it at the end of the 8th century, and during the next 2 centuries it gradually grew in importance, till in the 10th century the people acquired the right of electing their own magistrates. The city was governed by a senate of 100 persons, with an executive of 4, and afterward of 6 consuls. In 1207 the chief executive functions were assigned to a

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single magistrate called the *podesta*. In 1215 the Floreutines began to take part in the civil war between the Guelphs and Ghibellines which convulsed Italy. After a contest which lasted for 33 years, the Guelph or papal party was beaten and expelled from the city. In 1250 the citizens took arms against the nobles, defeated them, demolished their fortified palaces, and established a democratic government, with a chief magistrate styled "the captain of the people" at its head, and various councils chosen from all classes of the popnlation. In 1282 the republic adopted a new system of government, which continued unchanged for several centuries. A long series of civil wars between the factions of the Bianchi and Neri ensued, in spite of which, however, the city grew very rich and powerful. It became the financial capital of Europe, and its merchants carried on an immense trade with foreign countries. The population amounted to 150,000, and the armed militia, who could be called together by the tolling of a bell, were reckoned at 25,000. In 1342, Gaultier de Brienne, an adventurer who bore the title of dnke of Athens, became lord of Florence by a *coup d'état*, bnt after a year of cruel despotism he was deposed and driven from the city by a sudden insurrection of the people. The anniversary of this revolution, July 26, 1343, is still celebrated at Florence. The republic was restored, and continued to flourish in spite of factions, insurrections, and civil and foreign wars, till the 15th century, when the family of the Medici obtained a controlling influence in its affairs, which resulted in the final overthrow of republican institutions in the 16th century. (See MEDICI, and TUSCANY.)—A "Florentine History," by H. E. Napier (6 vols. 12mo.), was published in London in 1846–'7. For descriptions of Florence see "European Capitals," by William Ware (12mo., Boston, 1851), and "Six Months in Italy," by George S. Hillard (12mo., 6th ed., Boston, 1858).

FLORES, the westernmost of the Azores islands in the N. Atlantic ocean; lat. 39° 25' N., long. 31° 12' W.; length 30 m., breadth 9 m.; pop. 9,000. Its name was given it by the Portuguese in allusion to the multitude of flowers with which it appeared to be adorned. Chief towns, Lagena and Santa Cruz.

FLORES, FLORIS, ENDE, or MANGARAI, an island of the Malay archipelago, E. of Java, between lat. 7° and 9° S., long. 120° and 123° E.; length E. and W. about 200 m., average breadth 45 m. The strait of Flores on the E. separates it from the islands of Solor and Adenar. It has a hilly surface, and like all the islands of the same chain is of volcanic formation. There are 2 active craters, one of which has an elevation of 7,000 feet, and the other of 1,500. The island produces copper, according to native accounts, and also small quantities of gold and iron, not in sufficient amount to be profitably worked. The forests yield sapan wood and dye wood; rice, maize, edible roots, and a good species of cotton, are cultivated. Cotton is exported to Celebes to be manufactured. The other principal articles of trade are benzoin, ambergris, beeswax, slaves, and ship's provisions, payment for which is made in cutlery, gunpowder, glassware, and linen. The natives are divided into a number of distinct nations, all speaking different languages. The principal towns are Ende, with about 200 houses, Mangarai on the N. coast, Pota on the same side, the site of a Dutch fort and trading post, and Larantuka on the S. E., where the Portuguese have a small settlement. The Portuguese visited the island at an early period, and gave it the name of Flores. It was subordinate for a time to the Dutch presidency on Timor island, but in 1812 the Bugis expelled all the European settlers. Christianity has obtained a foothold by the labors of Portuguese missionaries, and the native traders generally sail under the Portuguese flag.

FLORIAN, JEAN PIERRE CLARIS DE, a French miscellaneous author, born at the chatean de Florian in Languedoc, March 6, 1755, died in Sceaux, Sept. 13, 1794. His nncle, the marquis de Florian, who had married a niece of Voltaire, placed him when 13 years old at Ferney with the philosopher, where he remained 3 years, when he became page to the dnke de Penthièvre, who snbsequently procured him a commission in a regiment of cavalry. He left his troop to attach himself as a *gentilhomme de cour* to the duke, at whose residence he pursued his literary avocations. Several of his dramatic writings were performed at the theatre of D'Argental, whose house in Paris was then the centre of attraction for men of science and letters, and on these occasions Florian often played the part of Harlequin. Though not the best of his works, some of his plays, as *Les deux billets*, *Le bon père*, *La bonne mère*, &c., have considerable merit, and the first still holds its place on the French stage. In 1783 he produced his *Galatée*, a novel in imitation of the "Galatea" of Cervantes; and in 1786, his *Numa Pompilius*, a classic romance in the style of Fénélon's *Télémaque*. After these appeared successively *Estelle*, a pastoral tale, *Gonzalve de Cordoue*, with a preliminary sketch of Moorish history, and a collection of "Fables," which are deemed the best that have been produced in France since the publication of those of La Fontaine. He wrote also several poems. On the outbreak of the revolution he retired to Sceaux; bnt he was soon dragged from his retreat, and consigned to a dungeon. Here he finished his poem of *Ephraim*, and wrote his romance of *Guillaume Tell*. He was liberated after the 9th Thermidor, when he returned to Sceaux, where he presently fell a victim to grief and anxiety. After his death appeared his translation of "Don Quixote," which is perhaps the least esteemed of all his works. The best uniform edition of his works is that of Paris in 1820, 16 vols.

FLORIDA, the southernmost state of the American Union, and the 14th admitted under the federal constitution, situated between lat. 24° 30' and 31° N., and long. 80° and 87° 45'

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W.; bounded N. by Alabama and Georgia, E. by the Atlantic ocean, S. and W. by the gulf of Mexico and the Perdido river, the latter dividing W. Florida from the gulf section of Alabama; area, 59,268 sq. m., or 37,931,520 acres. The state is divided into 33 counties, viz.: Alachua, Benton, Brevard (formerly St. Lucie), Calhoun, Columbia, Dade, Duval, Escambia, Franklin, Gadsden, Hamilton, Hernando, Hillsboro, Holmes, Jackson, Jefferson, Leon, Levy, Liberty, Madison, Manatee, Marion, Monroe (which includes the Florida keys), Nassau, Orange, Putnam, St. John's, Santa Rosa, Sumter, Volusia, Wakulla, Walton, Washington. Key West (called by the Spaniards *Cayo Hueso* or Bone Key) is the largest town in Florida, and is a place of great commercial and military importance. Tallahassee is the seat of the state government. Pensacola, Appalachicola, and St. Mark's are ports of W. Florida. Cedar Keys, Tampa, and Charlotte Harbor are the principal outlets on the W. side of peninsular Florida. St. Augustine, on the Atlantic coast, is the oldest town in the state, and is much resorted to by invalids on account of the equability of its climate. Jacksonville is a thriving commercial town on St. John's river. Fernandina is a new town at the N. end of Amelia island, and the Atlantic terminus of the railroad which has its gulf terminus at Cedar Keys. The population of the state at 4 periods was as follows:

U. S. Census.	White.	Free Colored.	Slaves.	Total.
1830	18,385	844	15,501	34,730
1840	27,943	817	25,717	54,477
1850	47,203	932	39,310	87,443
State census.				
1855	60,493	804	49,326	110,623

Of the white population in 1850 there were 25,705 males and 21,498 females; of the free colored (blacks 229, and mulattoes 703), 418 males and 514 females; and of the slave (black 36,288, and mulattoes 3,022), 19,804 males and 19,506 females. Density of population, 1.48 to a sq. m.; proportion of population to that of the whole Union, 0.38 per cent. Families (white and free colored) 9,107, and dwellings 9,022. Of the total population, 47,883 were under 20 years of age, 38,690 between 20 and 70, 779 between 70 and 100, 36 over 100, and 45 unknown; of those over 100, 5 were free colored and 29 slaves. White and free colored (total 48,135) born in Florida, 20,563; in other states, 24,755; in foreign countries, 2,757; unknown, 58. Of 13,135 males (white and free colored) over 15 years of age, 2,380 were engaged in commerce, trade, manufactures, mechanic arts, and mining; 5,977 in agriculture; 2,666 in labor not agricultural; 423 in the army; 708 in sea and river navigation; 357 in law, medicine, and divinity; 302 in other pursuits requiring education; 268 in government civil service; 12 in domestic service; 42 not specified. Slaveholders, 3,520, viz.: holders of 1 slave, 699; of 1 and under 5, 991; of 5 and under 10, 759; of 10 and under 20, 588; of 20 and under 50, 349; of 50 and under 100, 104; of 100 and under 200, 29; of 200 and under 500, one. Paupers in 1849–'50, 76; cost for the year, $937. Criminals convicted, 39; in prison, June 1, 1850, 11. Federal population (all the free and ⅗ of the slave), 71,721, which entitles Florida to one representative in congress.—Florida consists of a long narrow strip of territory extending S. from Georgia and Alabama from 30 to 80 m., and from the Atlantic ocean to the Perdido river about 360 m.; and of a peninsula extending from the mainland S. through 5° of latitude between the Atlantic and gulf of Mexico. Its coast line is of much greater extent than that of any other state, having a length of 472 m. on the Atlantic and 674 m. on the gulf; but this immense stretch of sea front is almost inaccessible on account of shallow soundings, and has few good harbors. S. from the mainland a chain of small rocky islands, called cays or keys, extends to the W., ending in a cluster of rocks and sand banks called the Tortugas. S. of the bank upon which these keys rise, and separated from them by a navigable channel, is a long narrow coral reef known as the Florida reef, which here constitutes the left bank of the Gulf stream. The most important of the keys is Key West, called also Thompson's island. For a long period the haunt of smugglers and pirates, it is now a naval station of great importance, and the seat of a band of wreckers whose business it is to assist vessels in distress. This key is abont 6 m. in length and 2 in breadth, with a large, well-sheltered harbor. The extensive ponds thereon yield annually a large amount of salt. The Tortugas derive their name from the vast number of turtles found in the neighboring waters. The most important harbors are: on the gulf coast, Pensacola, Appalachicola, St. Mark's, Cedar Keys, Tampa, Charlotte, and Key West; and on the Atlantic coast, St. Augustine and Fernandina. Jacksonville on St. John's river has also a good harbor.—The rivers of Florida are numerous, and many of them afford great facilities for internal navigation. St. John's river rises in the great southern marsh, and reaches the ocean after a N. course of 300 m. in lat. 30° 20′ N.; for nearly 100 m. from its mouth it is a wide sluggish sheet of water, more resembling a lagoon than a river. It is navigable to Lake George, a little higher up, for vessels drawing 8 feet of water, and nearly to its head for smaller craft. Indian river is a long lagoon having much the same character, and communicates with the ocean by an outlet in lat. 27° 30′. It is now proposed to connect these two waters by a short canal, and by this means secure an inland navigation from the mouth of the St. John's to Jupiter inlet, a distance of about 250 m. Charlotte and Amaxura are the principal rivers on the W. side, the whole of which S. of the Suwannee contains only small streams. The Suwannee is formed by the Withlacoochee and Allapaha from Georgia, and reaches the gulf at Wacasasa bay. The Ockloconee also rises in Georgia. The Appalachi-

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cola, formed on the N. frontier by the junction of the Chattahoochee and Flint, falls into the bay of the same name after a navigable course of 60 m. The Choctawhatchee, Escambia, and Perdido rise in Alabama and flow S., the first into Choctawhatchee bay, the second into Pensacola bay, and the last into Perdido bay, severally arms of the gulf of Mexico. The Perdido forms the boundary between W. Florida and Alabama. The St. Mary's in the N. E. is common also to Georgia; it flows into the Atlantic in about lat. 30° 40' N., and is navigable for steamers to the town of St. Mary, and much further for sloops.—The S. portion of peninsular Florida from about lat. 28° is mostly an extensive swamp or marsh, called the Everglades, which during the rainy season between June and October is impassable. N. of this tract to Georgia the surface is generally a dead level, but in some parts it is undulating, and even presents eminences worthy the designation of hills. W. of the neck of the peninsula the ground is more uneven and rugged; but still the elevations are inconsiderable, and, where occurring, of very limited extent. The substratum of the E. part of the peninsula is clay mixed with sand, and that of the W. a kind of rotten limestone, which in many places is undermined by subterranean streams. The central district is the most productive, but even here a large portion is composed of poor pine barrens; yet in the midst of these are found gentle eminences (here called hummocks) of fertile land supporting a vigorous growth of oaks and hickories, while numerous rivulets of pure water flow through the country or expand into beautiful lakes. Further W. the land is more generally poor. Thus it appears that a small portion only of the state can be said to be available for cultivation; yet the warmth and humidity of the climate compensate in a great measure for the inferior character of the soil, and give it a vegetation of great variety and luxuriance. The climate of Florida has been extolled as one of the finest in the world. In the S. the temperature scarcely changes the year round, and summer is only distinguished by the copiousness of its showers. The average mean temperature of the state is about 73° F., and in no part does the difference between summer and winter exceed 25°, while at Key West it is not more than 11°. The average rain fall is 33 inches.—The productions of Florida are chiefly those which require a tropical sun to mature them. It is now ascertained that the sea island cotton (the production of which was formerly confined to a few small islands off the coasts of S. Carolina and Georgia) will grow luxuriantly even in the centre of the peninsula, and a fine quality of this staple has also been produced on the Suwannee. The soils are also adapted to the successful cultivation of the coffee plant, the cocoa palm, the sugar cane, cottons generally, Cuba and other tobaccos, rice, indigo, arrow root, Sisal hemp, New Zealand flax, &c.; and the climate is suitable for the cochineal insect and silkworm. The principal forest trees are red, live, and water oaks, mahogany, palmetto, magnolia, dogwood, and in the swamps pines, cedars, and cypresses. The fruits produced are of the most delicate descriptions; among them are oranges, lemons, limes, pineapples, olives, grapes, &c., all of which flourish luxuriantly; and garden vegetables are produced in the greatest abundance. The driest seasons are relieved by heavy dews, and the sun that would bake the earth in other parts, and wither vegetation, is here so tempered by the pervading moisture as to cover the surface with perennial verdure. The prairies afford excellent pasture. Here cattle require little care from their owners, and no housing in winter; and in most parts of the state hogs fatten without any other support than that which they derive from the roots and mast of the forests. Deer of various kinds abound, and smaller game is found in all parts of the country. The coast waters are productive of the finest fish, including the sheepshead, gronper, redfish, mullet, green turtle, and oysters, and the numerous lakes and rivers of the interior teem with fresh water species. On many parts of the coast sponges are found, and in this product the trade is constantly increasing. Among the mineral productions are amethysts, turquoises, lapis-lazuli, ochre, pit coal, and rich iron ore.—Among the most remarkable of the natural curiosities of Florida are the hollows called "sinks," worn in the soft limestone by subterranean streams, and varying in size from a few yards to several acres. The great sink of Alachua county, by which the waters of the Alachua savanna are supposed to flow into Orange lake, is a large basin almost surrounded by hills, into which the drainage of the savanna is conveyed by several conduits, uniting before they reach the basin in a single stream. From the basin the waters descend slowly by 3 great vent holes into the bowels of the earth, and are carried by underground channels to other basins. Numerous springs, bursting from great depths, some of them with sufficient force to turn a mill, are found in different parts of the state, and have led to the supposition that the parts of the country in which they exist may be undermined by vast caverns through whose roofs the springs well up with violence wherever an opening can be found. About 12 miles from Tallahassee there is a lake of icy cold transparent water which is fed by a subterranean source of this kind.—In 1850 Florida contained 4,304 farms and plantations, which covered 1,545,289 acres of land, and of this 349,049 acres were improved. Cash value of farms $6,323,109, and of farming implements and machinery $658,795. The number of cotton plantations was 990, and of sugar planters 958. (The census of 1855 returned 2,265,503 acres of land, valued at $13,910,981.) The live stock in 1850 consisted of horses 10,848, asses and mules 5,002, milch cows 72,876, working oxen 5,794, other cattle 182,415, sheep 23,311, and swine 209,453; which were valued at $3,830,058. Value of animals slaughtered in the year, $514,685. The products of agri-

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culture for the year ending June 1, 1850, were as follows: wheat 1,027 bushels, rye 1,152, oats 66,586, Indian corn 1,996,809, and buckwheat 56; potatoes, Irish, 7,828, and sweet, 757,226 bushels; hay 2,510 tons; hops 14 lbs., butter 371,498, and cheese 18,015; peas and beans 135,359 bushels; products of market gardens $8,721, and of orchards $1,280; beeswax and honey 18,971 lbs.; home-made manufactures $75,582; flax 50 lbs.; cane sugar 2,750,000 lbs.; molasses 252,893 galls.; ginned cotton 45,131 bales of 400 lbs.; rough rice 1,075,090 lbs.; tobacco 998,614 lbs.; wool 23,247 lbs.; silk cocoons 6 lbs.; wine 10 galls. The total value of agricultural products in 1840 was $1,817,718, and in 1850 $3,865,059. Average crops to the acre: wheat 15 bushels; Irish potatoes 175 bushels; rice 1,850 lbs.; seed cotton 250 lbs.; cane sugar 750 lbs. But little progress has been made in manufactures and the mechanic arts. In 1850 there were only 103 establishments in all the state, and the capital invested therein amounted only to $547,070; value of raw material used $220,611; hands employed 991, viz., males 876, and females 115; cost of labor $190,452; products of the year $668,335. Under this head are included 15 fisheries, capital $13,975, and one saltery, capital $19,000. Including domestic manufactures, the value of products in 1840 was $587,167, and in 1850 $924,495. The exports (all domestic products) from Florida for the year ending June 30, 1858, were valued at $1,877,552, viz.: in American vessels $1,330,960, and in foreign vessels $546,592; and the imports from foreign countries at $164,950, viz.: in American vessels $151,859, and in foreign vessels $13,091. The amount of shipping employed in this trade was 128,801 tons, viz.: outward 58,633 tons (American 50,887, foreign 7,746), and inward 70,168 tons (American 62,450, foreign 7,718). The chief articles exported were boards, planks, scantling, lumber, cotton, tobacco, and fish. The shipping owned in the state (including 1,534 steam) amounted to 20,909 tons, of which 13,714 was registered and 7,195 enrolled and licensed. There were built in the year 5 vessels, aggregate burden 549 tons. The coasting trade is also very extensive, employing numerous steamers, which with other craft carry immense freights to Savannah, Charleston, Baltimore, Philadelphia, and New York. It must be remembered, however, that a large portion of the material exported from Pensacola and Appalachicola originates in southern Alabama and southwestern Georgia. The great bulk of foreign merchandise consumed in the state is also entered coastwise, chiefly from the northern ports.—There are no banks of issue in Florida. Of internal improvements Florida has until within a few years been remarkably destitute, but recently she has taken active measures to remedy the defect by the construction of railroads. The principal lines are: the Florida railroad, across the neck of the peninsula from Fernandina on the Atlantic to Cedar Keys on the gulf, 154 m., with a branch to Tampa, 150 m.; the Florida and Alabama railroad, 45 m., from Pensacola to the Alabama line, where it will join the Alabama and Florida railroad, extending thence to Montgomery, 116 m. further; the Florida, Atlantic, and Gulf central railroad, 59 m., and the Pensacola and Georgia railroad, 259 m., which together will form a line from Jacksonville on the St. John's, *via* Alligator and Tallahassee, to Pensacola; and the Tallahassee railroad, from Tallahassee to St. Mark's, on Appalachee bay, 21 m. The whole system will comprise about 688 m., of which on June 30, 1859, there was completed 216 m., and the remaining portions will all be in operation within the next 3 years. These works are of the highest importance to the domestic industry of the state, and will give a beneficial impulse to all its interests. The Florida railroad will also facilitate and shorten the duration of travel between the Atlantic seaboard and the gulf ports, and avoid the necessity of a dangerous navigation round the southern point of the peninsula. Ultimately the Florida system of roads will be connected with that of Georgia by means of a branch of the main trunk line of the latter state, which has its eastern terminus at Brunswick and Savannah, and with Mobile and New Orleans by extensions westward from Pensacola. The average cost of the Florida roads will be about $20,000 per mile, and the several companies owning them are aided to the extent of $10,000 per mile from the state internal improvement fund—a fund based on congressional grants of land and the vast swamp lands which have been ceded to the state. On June 30, 1858, the mail routes in Florida had a length of 4,545 m., of which 120 m. was railroad, 1,971 steamboat navigation, 784 coach road, and 1,670 other road.—In 1850 Florida contained 177 churches, of which 56 belonged to the Baptists, 10 to the Episcopalians, 87 to the Methodists, 16 to the Presbyterians, 5 to the Roman Catholics, and 3 to other denominations; these afforded accommodation for 44,960 persons, and as property were valued at $165,400. The educational institutions in the state at the same period consisted of 34 academies and private schools, with 49 teachers and 1,251 pupils, and an annual income of $13,089; and 69 primary and public schools, with 73 teachers and 1,878 scholars, and an income of $22,386. The number of children (white and free colored) attending school during the year 1849–'50, as returned by families, was 4,812; and the number of persons of the same classes over 20 years of age, who were unable to read and write, was 4,129. There are no colleges in the state. On July 1, 1856, there were 20,261 children between 5 and 18 years of age, and in the same year $6,059 was appropriated to common schools. The return does not state the number then at school. The number of newspapers issued in 1850 was 10, of which 9 were weekly and 1 tri-weekly, and 7 were political and 3 religious. The total circulation was 5,750, or annually

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319,800 copies.—The constitution of Florida secures the right of voting to every free white male citizen of the United States who has resided in the state 2 years and in the county 6 months next preceding an election, and whose name is on the electoral register. The general election is held on the 1st Monday in October, biennially. The legislature consists of a senate of 19 members, elected for 4 years (one-half biennially), and a house of representatives of 40 members, elected for 2 years. Senators must be 30 and representatives 21 years of age, and are paid $3 per diem. Sessions are biennial, commencing on the 4th Monday in November (even years). The governor is chosen for 4 years, and has a salary of $1,500 and $500 for a residence. He must be 30 years of age, have been a citizen of the United States 10 years, and a resident of the state 5 years. In case of disability or death, he is succeeded by the president of the senate or speaker of the house. The secretary of state (salary $500 and fees), comptroller (salary $1,100), and state treasurer (salary $800) are elected by joint vote of the assembly, the first for 4 years, and the last 2 for 2 years. The judiciary consists of a supreme court, circuit courts, and justices of the peace. The supreme court is composed of a chief and 2 associate justices, and holds 4 sessions annually, viz., at Tallahassee, Tampa, Jacksonville, and Marianna. The jurisdiction of this court is entirely appellate. For circuit court purposes the state is divided into the western, middle, eastern, and southern circuits, each of which has a judge who is president of the court. These courts have original jurisdiction in all matters, civil as well as criminal. All judges are elected by the people, and have each a salary of $2,000. The receipts into the treasury, mostly from taxes and sales of land, during the year ending Oct. 31, 1856, amounted to $94,022, and the expenditures to $76,430, of which sum $20,408 was on account of the judiciary, $7,482 of the executive, $10,862 of criminal prosecutions, $15,057 of jurors and witnesses, $2,592 of Indian hostilities, $10,826 of the legislature, &c. The public debt (not including the repudiated territorial debt) amounted in the same year to $193,000; in Oct. 1858, it was stated at $380,000. The resources of the state are ample, consisting of vast tracts of railroad lands, swamp lands, and other property. The valuation of taxable property in the state in 1850 was $23,198,734, and in 1856, $49,461,461.

—The name of Florida (which signifies the florid or flowery, and was given by the Spaniards in allusion to the aspect of the country, and partly also because it was first visited by them on *Pascua Florida*, or Easter Sunday) was originally not confined to the state now known by that appellation, but extended over an indefinite region northward and to the Mississippi. The first visitant to the actual territory of Florida was Ponce de Leon, who landed near St. Augustine in 1512. It was subsequently visited in 1520 by Vasquez, a Spaniard; in 1523 by Verazzani, a Florentine; and in 1524 by De Geray, a Spaniard. Two years later Pamphilo de Narvaez obtained a grant from Charles V. of all the lands from Cape Florida to Rio Panuco. In 1528 he landed with a numerous army at Appalachee, but met with a formidable resistance from the Indians, and at last perished on the coast near the Panuco by shipwreck, only 10 of his followers returning to Spain. In 1539 Fernando de Soto explored Florida, and after visiting many remote regions, and having passed through a series of romantic adventures, appears to have died on the banks of the Mississippi in 1542. About the middle of the 16th century many Protestants of France sought refuge in Florida, but only to experience greater evils than they had endured at home. In 1564 they were attacked by the Spaniards, and many were hung on the trees with an inscription purporting that they were destroyed "not as Frenchmen, but as heretics." This barbarity was soon afterward avenged by a party of Frenchmen, who attacked the Spanish fort, and hung up the garrison on the same trees that sustained the mouldering bones of their countrymen, inscribing over them that they were executed "not as Spaniards, but as cut-throats and murderers." The Spaniards, however, persevering in their attempts to obtain a foothold in Florida, established a fort at St. Augustine in 1565, which they held until 1586, when it was captured by Sir Francis Drake. Two years earlier Captains Barlow and Amidas had taken nominal possession in right of England of the country on the N. coast of Florida. From this period for nearly a century, history is silent in relation to this country. In 1682 La Salle visited W. Florida or Louisiana. In 1696 Pensacola was settled by the French. The Spanish settlements on the E. coast suffered greatly from the buccaneering inroads of the English. In 1702 the Carolinians made an unsuccessful attack on St. Augustine, but in 1704 captured Fort St. Mark. The subsequent expedition of Oglethorpe against the Spanish settlements will be spoken of in the article GEORGIA. In 1763 the whole province of Florida was ceded to Great Britain in exchange for Cuba, which the English had then recently taken. Soon after the cession the British divided the territory into two provinces, the river Appalachicola being the boundary between them, and by a proclamation invited settlers. Many Carolinians emigrated in consequence thereof; and about 1500 Greeks, Italians, and Minorcans were brought from the Mediterranean and settled at a spot about 60 m. S. of St. Augustine, where they began the cultivation of indigo and the sugar cane. During the revolutionary war privateers were fitted out at the ports of Florida, by which the trade of the southern provinces was severely harassed, and the Indians were encouraged to a barbarous hostility against the Americans. In 1778 Gen. Prevost marched from Florida into Georgia and captured Savannah and other towns. While engaged on this

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expedition, however, he left his province open to incursions from Louisiana. In 1779 the Spaniards invested the garrison and settlement of Baton Rouge, and compelled them to surrender, and in May, 1781, Pensacola was captured. By the treaty of 1783 Florida was retroceded to Spain, and the greater part of the inhabitants deserted the country and settled in the United States. When Louisiana was ceded to the United States by France in 1803, it was declared to be ceded with the same extent that it had in the hands of Spain, and as it had been ceded by Spain to France. The terms of this cession gave rise to a claim on the part of the United States to the country west of the Perdido river; and to prevent the occupation of this territory by any other power, the government of the Union took possession in 1811 of the principal posts. The rest of Florida, however, remained unmolested until the second war between the United States and Great Britain. In 1814 a British expedition having been fitted out from Pensacola, Gen. Jackson marched against that town and captured it. In 1818 it was again taken by Jackson, and also Fort St. Mark, but they were subsequently restored to Spain. Finally in 1819 Spain ceded the whole province to the United States, and possession was surrendered to that government in July, 1821. Immigration now set in to the territory, but the unsurveyed state of the lands, the uncertainty of titles, &c., militated against its rapid settlement; and the Seminoles, a fierce and warlike Indian race, occupied the best lands, rendering it impossible to obtain them for cultivation. Yet in spite of these obstacles, a considerable population planted themselves in the country. In 1835, however, a deadly war between the Indians and settlers broke out, and suspended what progress had hitherto been effected. A long contest ensued between the savages and the U. S. troops, which is known as the Seminole war, and resulted in 1842 in a treaty by which the greater number of the Indians were removed to the west of the Mississippi. The few remaining Indians continued to be a great trouble to the country, and on several occasions committed great depredations on the settlers; but on May 4, 1858, the whole body was removed, and on the 8th of the same month Gen. Loomis, then commanding in Florida, issued a proclamation declaring the war closed. It is supposed that these Indian wars have cost the nation not less than $30,000,000, beside thousands of lives. Florida was erected into a territorial government by act of congress, March 3, 1819, and was admitted into the Union, March 3, 1845.

FLORIN (It. *fiorino*), in the 11th century, in Florence, a gold coin of about the value of a ducat, bearing an impression on the obverse of a lily, and on the reverse of John the Baptist. It was soon imitated in other cities of Italy and in France and Spain, and in Germany gave origin to the mediæval *Goldgulden* and the later *Gulden*, which are still distinguished by the abbreviation (Fl.). The florin is now the appellation both of gold and silver coins in Europe, which vary in value in different countries. (See Coins.)

FLORUS, Lucius Annæus, a Roman historian, probably of Spanish birth, lived under the emperors Trajan and Hadrian. He is the author of an epitome of Roman history, in 4 books, extending from the foundation of the city to the time when Augustus closed the temple of Janus. The work is conceived in a philosophical spirit, and characterizes the times and the men with justness and precision; but the style is declamatory, abounding in extravagant conceits and metaphors. The *Pervigilium Veneris* and 3 other short poems are with little authority ascribed to this writer.

FLOTOW, Friedrich von, a German composer, born in Teutendorf, Mecklenburg-Schwerin, in 1811. He was destined for diplomacy, but a fondness for music led him in early youth to Paris, where he was instructed in composition by Reicha. During the revolution of 1830, he returned to Germany, but soon after found his way back to Paris with several operas composed in his absence. He tried in vain to have these produced at one of the theatres of Paris, and it was only after their performance in private had excited the attention of amateurs, that he received a commission in 1838 to furnish the music for the "Shipwreck of the Medusa." The opera proved highly successful, having been performed 54 nights at the *théâtre de la renaissance*. Since that time he has much increased his reputation by the *Forestier*, *L'esclave de Camoëns*, *Albin*, *Alessandro Stradella*, *L'âme en peine*, and *Martha*; the last, which has been reproduced in several modern languages, being one of the most popular operas now on the stage.

FLOTSAM, an old word, used in connection with others equally barbarous, as jetsam and legan (or ligan), to designate different kinds of wrecked goods. Whether lawyers made them, or adopted them from seamen, is not certainly known; but the latter is supposed to be the case. Goods flotsam are goods which floated away when a ship was wrecked. Goods jetsam were those cast over from a ship in peril. Goods legan were goods which were cast out, but, because they would sink and be lost, were tied to wood or a cask or some other substance which would float. These words are now seldom if ever used; but the word jettison, formed probably from jetsam, is often used in insurance law and practice. It means properly the act of casting goods over board; thus goods are said to be jettisoned, and a loss is said to be by jettison; and more rarely and inaccurately, the goods cast over are called the jettison; as, "the jettison consisted of such and such goods."

FLOUNDER, a flat fish of the family *pleuronectidæ* or *planidæ*, which also includes the halibut, sole, and turbot. This family, containing about 150 species, is found generally in comparatively shallow water, where the bottom is sandy; but the halibut and turbot are caught

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in deep water. The body is flat, compressed vertically, so that the dorsal and ventral surfaces are mere fin-bearing edges, the sides forming ovate disks variously colored, the darkest being popularly called the back and the white side the belly, while in reality these surfaces are the sides. The most remarkable character of the family is the want of symmetry in the mouth and head, both eyes being turned to that side which is uppermost when the animal swims, and which is always the darkest; the bones of the head, especially the presphenoid and the middle frontal, are distorted to allow this arrangement of the parts; behind the scapular arch there is no want of symmetry in the vertebral column. The dorsal fin fringes the whole back, from near the tail to as far forward as the nostrils, the anal fringing the lower edge in a similar manner; the jaws and the ventrals are generally unsymmetrical, the latter being smaller on the pale side. The branchiostegal rays are 6; the air bladder is absent, and the vent is very far forward. The flounder belongs to the genus *platessa* (Cuv.); in this the eyes are generally on the right side, one above the other; the teeth are broad and cutting, and in a single series in the jaws, but generally pavement-like on the pharyngeals; the dorsal commences over the upper eye, and neither it nor the anal extends to the caudal; there are 3 pancreatic cæca. The common flounder of Massachusetts (*P. plana*, Mitch.) varies in length from 10 to 22 inches, and in color (on the right side) from dull slate to rusty and blackish brown; the scales are small, and the surface smooth. This species is considered excellent for the table in the summer and autumn, and is caught in considerable numbers from wharves and bridges. Another species is the rusty dab (*P. ferruginea*, Storer), from 12 to 20 inches long, of a reddish slate color, with rusty spots, and the lower surface tinged with yellow. The New York flounder is the *P. dentata* (Mitch.), of about the same size, but considered inferior for the table; the color is reddish brown. Among species with eyes on the left side are the *P. oblonga* (Mitch.), growing to a length of 30 inches; and the *P. stellata* (Pallas), an arctic flounder, of a liver-brown color and about a foot in length. These species are said to be "reversed" when the eyes are on the left side in the first series, and on the right in the second; they are said to be "doubled" when both sides are colored; according to Dekay, the *P. melanogaster* (Mitch.) is a doubled variety of the *P. dentata* (Mitch.). Flounders extend, though in diminished numbers and of smaller size, into high northern latitudes; they are very abundant on the coasts of New Brunswick and Nova Scotia in the summer season. Like all the family, flounders are very tenacious of life, may be transported considerable distances, and may be naturalized in brackish and even in fresh water. The distortion of the flounder family admirably adapts them for swimming upon the bottom, where the situation of both eyes on the upper surface of the head allows an extensive range of vision; having no means of defence, the coloration of one side, resembling the bottom on which they swim, serves as a protection against enemies. The food consists of minnows and other small fry, young fish, soft-bodied marine animals, and aquatic insects. There are as many as 16 species in the British islands, which are gradually reduced to 13 in the Baltic, 10 on the coast of Norway, 5 at Iceland, and 3 in Greenland. The English plaice (*P. vulgaris*, Flem.), called also fluke in Scotland, is a much esteemed fish; the spawning time is in February or March, and it is in the best condition for the table at the end of May. The English flounder is the *P. flesus* (Flem.), and may be distinguished from the plaice by the rough lateral line. The common dab (*P. limanda*, Flem.) derives the specific name from the roughness of its scaly surface, and, with other species, is considered an excellent fish; they are taken both by hook, spear, and in nets.

FLOURENS, Marie Jean Pierre, a French physiologist, born in Maureillan, Hérault, in 1794. He was graduated as M. D. when only 19 years old, repaired to Paris, where he became acquainted with Chaptal, the Cuviers, and Geoffroy St. Hilaire, and in 1821 delivered a course of public lectures upon the physiological theory of sensation, and presented to the academy of sciences a series of papers upon the organization of men and animals. He was already a contributor to the *Revue encyclopédique*, and to the *Dictionnaire classique d'histoire naturelle*. In 1822 his essay upon the *Détermination des propriétés du système nerveux, ou recherches physiques sur l'irritabilité et la sensibilité*, was highly praised by Cuvier for accuracy and originality. His reputation was further enhanced by his *Recherches sur les conditions fondamentales de l'audition et sur les diverses causes de surdité* (1824), and by his *Recherches expérimentales sur les propriétés et les fonctions du système nerveux dans les animaux vertébrés*, which he completed in 1825 by his *Expériences sur le système nerveux*. The two last papers present a very ingenious and thorough method of determining the relations of the individual organs to the various phenomena of intellect, sensation, and motion. In 1828 he was admitted to the academy of sciences, and was at the same time appointed assistant professor of natural history in the college of France. Two years later he became assistant lecturer on comparative anatomy at the *jardin du roi*, and in 1832 he was made titular professor at the museum. The next year he succeeded Dulong as perpetual secretary of the academy of sciences, and in 1840 the French academy elected him a member. From 1841 to 1854 he published a series of small works, giving in a condensed form and perspicuous style the history and philosophy of several branches of science, which he thus made accessible to the general reader. These popular publications did not interfere with his special

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researches, lectures, and reports to the academy of sciences. Among the last may be cited the paper which he read in 1847 on chloroform. His *Cours sur la généalogie, l'ovologie, et l'embryologie*, delivered at the museum of natural history and published in 1836 by Deschamps, and his *Cours de physiologie comparée: de l'ontologie, ou étude des êtres*, are equally remarkable for perspicuity and fulness. His *Anatomie générale de la peau et des membranes muqueuses* (4to., Paris, 1843), intended to demonstrate anatomically the physical unity of mankind, and his *Théorie expérimentale de la formation des os* (Paris, 1847), which contains a demonstration of the principle that "matter changes and renovates incessantly, while form and force persist," greatly added to his reputation in the scientific world. But his most popular book is that entitled *De la longévité humaine et de la quantité de vie sur le globe*, which appeared in 1854, and passed through 3 editions within a few months. Flourens was a deputy of the department of Hérault in 1838, and was made a peer of France by Louis Philippe in 1846, without however taking much part in politics.

FLOWER, in botany, that portion of the plant where the organs of reproduction are found. These may be present in the simplest condition, or with all the accompanying modifications, as style or pistil, stamens, petals, sepals, &c. The flower seems to be the portion of the vegetable on which nature has bestowed the most pains. The least conspicuous flowers reveal under the microscope an exquisite beauty. The origin and development of the flower may be thus stated. In the angle formed by the leaf and stem, called the axil, small aggregations appear called buds; these are of two kinds, leaf buds and flower buds. (See Bud.) As all buds originate in the axils of previous leaves on the stem, it follows that the floral organs issuing from the flower buds must observe the same law. The floral leaf, from whose axil the flower bud issues, is called the bract, and all the rudimentary leaves of similar character which are borne between the bract and upon the stem of the flower, are *bracteolæ*, or small bracts. The color does not form any criterion of the floral organs, because even these bracts are often more highly colored than the flower itself. Thus, in the *arum*, the bract, which is greatly expanded, is deeply colored and wrapped around the base of the cluster of flowers as if to afford some kind of protection; and in the *calla* the bract is similar, but of a snowy white. In such instances the bract is called the spathe. Sometimes several bracts are formed in the shape of the spokes of a wheel around the cluster of flowers, which arrangement is called the involucre. It often happens that such bracts, whatever their size, shape, or arrangement, are the most showy portions of the plant, and, being in the vicinity of the flowers, are mistaken for parts of them. In *Poinsettia pulcherrima* the bracts are large, numerous, and of a splendid scarlet, while the flowers are small and of a greenish hue. From such instances we can descend to others where the bracts are so meagre that they resemble mere chaff, like the glumes and paleæ of the grasses. The mode in which the flower bud expands itself is called the inflorescence. The following may serve for illustration. The flower is solitary and axillary when a single flower bud unfolds in the axil of a leaf and its stem lengthens; but if there is no lengthening of the stem beyond the development of the flower bud, the flower is terminal. When all the buds on a newly formed branch develop as flowers, we have the spike; and when beside this each flower has a flower stalk, we have a raceme. When the flowers are closely packed together upon a succulent branch, we have the spadix. When there are numerous flower buds upon the same branch, sometimes the uppermost first expands, and the inflorescence is centrifugal; but if the lower ones open first in order, the inflorescence is centripetal. Other variations of form have appropriate terms. There are portions of the flower called floral envelopes; they are found to be in whorls, and though really only modified leaves, yet they differ in size, color, and uses. When a single whorl is present, it is termed the calyx; but when there are two or more, the inner is the corolla. In some plants the calyx and corolla look alike, and structurally there is no difference in any case. These envelopes may be highly developed and possess signal beauty, as in the lily and tulip, or become almost obliterated like the aigrette of the composite flowers, where the calyx is a mere rim. It is sometimes almost impossible to distinguish the calyx and corolla, in which case the envelopes are called perianth or perigonium. They may be entirely wanting, when the flowers are called achlamydeous or naked. Great variations in the growth, appearance, and shape of these envelopes may occur, which give rise to distinctive names. Immediately within the row of petals is a whorl of organs, called stamens, considered essential in the process of fecundation. These also vary essentially in numbers, size, form, &c., in suppression of their parts, and in their mode of connection with the floral envelopes. Next in order, the disk is to be noticed, which consists of whatever comes between the stamens and the central parts. In some plants it would appear that the disk was only an abortion produced by the suppression of an inner row of stamens. The nectary of the Linnæan botanists is the same as the disk. The pistil is the fruit-bearing organ of the flower, and is situated in its centre, and within the circle or whorl of stamens, and inside the disk if there be any present. The pistil is divided into stigma or summit, style or filament, stalk or support, and ovarium, a hollow case containing the ovula. The pistil, like the stamens, is a modified leaf, which is converted into the carpel. Sometimes many carpels are present, and they are subject to an almost infinite variety of forms and shapes, which at length form the fruit. A large number of plants have hitherto been con-

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sidered for the most part flowerless or cryptogamic; but later researches have demonstrated that they are not so, the extreme deviations from the usual forms of flowers, and the peculiarity of their fecundation, allying them to the animal economy, having been overlooked.

FLOWERS, Artificial. The manufacture of artificial flowers has of late years reached a high degree of perfection. The Italians, unequalled for a long time for their skill in this art, have now found successful competitors among the French and English. Even the most rare and delicate plants are imitated with wonderful accuracy, and from the opening bud to the fading flower and decaying leaf, all the changes of nature are faithfully represented. The first artificial flowers manufactured among civilized nations were from ribbons of various colors twisted together and fastened to wire stems. These, though they bore some remote resemblance to natural flowers, must have been but indifferent copies, and in time feathers were substituted, being more elegant, though there was more difficulty in getting them to take the required colors. The natural plumage of the gayly-colored South American birds is peculiarly adapted for this purpose, always retaining its brilliant hues. The savages of that country have long been familiar with the art of manufacturing flowers from such plumage. The delicate feathers found under the wings of young pigeons are among the most esteemed in flower making. Beautiful flowers made from the feathers of humming birds may be seen in the zoological gardens in Regent's park, London. In Italy the cocoons of silkworms are frequently used, taking a brilliant color, and having a soft velvety appearance. The French make great use of cambric, and, in the manufacture of certain kinds of flowers, of gauze, muslin, and crape, while sometimes the thicker materials of satin and velvet are necessary. Whalebone in very thin leaves, bleached and dyed of various hues, has been successfully employed by M. de Bernardière. The coloring matters used in flower-dyeing are as follows: for red, carmine dissolved in a solution of carbonate of potash; for blue, indigo dissolved in sulphuric acid, diluted and neutralized in part by Spanish whiting; for bright yellow, a solution of turmeric in spirits of wine; for violet, archil and a blue bath; for lilac, archil. Cream of tartar brightens the red, blue, and yellow colors.

FLOY, James, D.D., an American clergyman of the Methodist Episcopal church, born in New York, Aug. 20, 1806. He was graduated at Columbia college, and afterward spent 3 years in Europe perfecting his education. He had been of a sceptical turn of mind, but after his return joined the Methodist church, and at once entered upon a course of study preparatory to the ministry. He was admitted into the New York conference in 1833, and has filled several important offices in the church, beside conducting the "National Magazine" and a paper called the "Good News." He edited the posthumous works of the Rev. Dr. Olin, an was one of the members of the committee on versions of the American Bible society which prepared its standard edition of the Bible.

FLOYD, the name of counties in several of the United States. I. A S. W. co. of Va., lying on the N. W. slope of the Blue Ridge; area, 279 sq. m.; pop. in 1850, 6,458, of whom 443 were slaves. Almost the entire surface is elevated, rough, and mountainous, some of the land being unfit for cultivation, though much of it is well adapted to pasturage. The mineral productions are chiefly copper and iron. Water power is abundant, and there are numerous mills in operation. In 1850 the county yielded 104,630 bushels of Indian corn, 23,992 of wheat, 92,654 of oats, and 3,226 tons of hay. There were 9 churches, and 832 pupils attending public schools. Organized in 1831, and named in honor of the Hon. John Floyd, then governor of Virginia. Capital, Jacksonville. Value of real estate in 1856, $1,615,068. II. A N. W. co. of Ga., bordering on Alabama; area, 540 sq. m.; pop. in 1852, 12,079, of whom 4,259 were slaves. It has a beautifully diversified and well watered surface, rising in some parts into mountains, the highest of which is Taylor's ridge. The Etowah and Oostenaula rivers unite at the county seat to form the Coosa. The land along their banks is of excellent quality, and yields large crops of cotton, grain, and potatoes. In 1850 the productions amounted to 1,976 bales of cotton, 254,722 bushels of Indian corn, 15,370 of oats, and 36,818 of sweet potatoes. There were 2 newspaper offices, and 409 pupils attending public schools. Iron, plumbago, galena, slate, satin spar, and agate are found in the county, and in the S. W. part there is a valuable mineral spring. Organized about 1833, up to which time the land had been occupied by the Cherokee Indians. Capital, Rome. Value of real estate in 1856, $2,056,096. III. An E. co. of Ky.; area, about 750 sq. m.; pop. in 1850, 5,714, of whom 149 were slaves. It has a hilly surface, and a soil suitable for pasturage. It is rich in mines of hard coal, and its staple productions are Indian corn and pork. In 1850 it yielded 208,325 bushels of corn, 17,521 of oats, and 13,541 lbs. of flax. There were 4 churches, and 302 pupils attending public schools. Formed in 1799, and named in honor of Col. John Floyd, an officer in the revolution. Capital, Prestonburg. IV. A S. E. co. of Ind., bordering on the Ohio river, which separates it from Kentucky; area, 148 sq. m.; pop. in 1850, 14,875. Both surface and soil are much diversified. A range of steep hills, called the "Knobs," about 500 feet in height, traverses the country from N. to S., and yields much valuable timber. There are extensive beds of iron ore, limestone, sandstone, and slate. The staple productions are grain and pork, and in 1850 the county yielded 131,261 bushels of Indian corn, 30,706 of wheat, 61,154 of oats, and 3,241 tons of hay. Organized in 1819. Capital, New Albany. V. A N. E. co. of Iowa, traversed by Red Cedar river;

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area, about 550 sq. m.; pop. in 1856, 2,444. It produces grain and pasturage. In 1856 the harvest amounted to 3,842 tons of hay, 5,889 bushels of wheat, 7,759 of oats, 64,097 of Indian corn, and 10,666 of potatoes. Capital, Webster.

FLOYD, Gen. John, an American statesman and soldier, born in Virginia, Oct. 3, 1769, died in Camden co., Ga., June 24, 1839. His father, having suffered severe pecuniary losses during the revolutionary war, brought up his son to the trade of a carpenter, and about 1791 emigrated with him to Georgia, where young Floyd was engaged for many years in building boats near the mouth of the Santilla river. Retiring with a competency, he served in the state legislature, was chosen representative from Georgia in the general congress in 1826, served there 2 years, and was afterward appointed a major-general of militia. During the war of 1812 he rendered efficient service in protecting the state, and also during the Indian wars which followed.

FLOYD, John Buchanan, U. S. secretary of war, born in Montgomery (now Pulaski) co., Va., in 1805. He was graduated at South Carolina college in 1826, studied law, was admitted to the bar in 1828, and in 1836 removed to Helena, Arkansas, where he practised his profession for 2 or 3 years. In 1839 he returned to Virginia, and settled in Washington co. In 1847 he was elected to the lower branch of the Virginia legislature, and was reëlected in 1849. In December of that year the general assembly chose him governor of the state for the term expiring Jan. 1, 1853. In 1855 he was again elected to the legislature. In 1856 he was chosen a presidential elector, and voted for James Buchanan, for whose nomination he had exerted himself at the democratic national convention at Cincinnati, and in whose favor during the contest preceding the election he had made many speeches. In March, 1857, he was appointed by President Buchanan secretary of war.

FLOYD, William, an American general, and one of the signers of the declaration of independence, born in Suffolk co., N. Y., Dec. 17, 1734, died in Western, Oneida co., Aug. 4, 1821. He was the son of an opulent land owner, whose ancestors had immigrated from Wales, and settled on Long island. On the outbreak of the differences between Great Britain and her American colonies, Floyd ardently espoused the cause of the latter, and was appointed to the command of Suffolk county, and a delegate to the first continental congress in Philadelphia. During his absence the British assembled a naval force in Gardiner's bay, with the intention of invading Long island and levying contributions; but just as they were about to carry out their object, Gen. Floyd returned, assembled the Suffolk militia, and displayed so much energy and daring that the enemy abandoned their enterprise. In 1775 he was again appointed a delegate to the general colonial congress, and continued a member by successive elections for 8 years. In 1777 he was chosen a senator of the state of New York, retaining at the same time his seat in congress. He was a member of the first congress under the constitution, which met in New York in 1789, and at the close of his term declined a reëlection. He was one of the presidential electors in 1801, giving his vote to Mr. Jefferson. In the same year he was chosen a member of the convention to revise the constitution of his native state, and was afterward twice presidential elector.

FLÜGEL, Gustav Lebrecht, a German orientalist, born in Bautzen, Feb. 18, 1802. He devoted himself to philological, and especially to oriental studies at Leipsic, Vienna, and Paris, and in 1832 obtained a professorship at Meissen, which he held till 1850, when he resigned it on account of his feeble health. His most important work is an edition of Hadji Khalfa's Arabic bibliographic and encyclopædic lexicon, with a Latin translation and commentary, published at Leipsic and London, at the expense of the oriental translation fund (1835–'54), in 7 volumes. He has made other translations from the Arabic, and published works on the Koran and on Arabic authors.—Johann Gottfried, a German lexicographer, born at Barby, near Magdeburg, Nov. 22, 1788, died in Leipsic, June 24, 1855. He was employed as a merchant's clerk until 1810, when he repaired to the United States, returned to Germany in 1819, and officiated as professor of the English language at the university of Leipsic from 1824 to 1838, when he was appointed U. S. consul in Leipsic. He is the author of *Triglotte, oder kaufmännisches Wörterbuch in drei Sprachen* (German, English, and French, 2d ed., 1854), *Praktisches Handbuch der englischen Handelscorrespondens* (6th ed., 1858), and other writings. His most popular work is his "Complete Dictionary of the English and German, and German and English Languages," which has passed through several editions, and is extensively used in Germany, England, and the United States.

FLUOR SPAR, fluoride of calcium, a mineral species consisting of fluorine 48.7, and calcium 51.3 per cent., named from the Latin *fluo*, in reference to its property of flowing when used as a flux. It is met with in crystals of cubical form, which easily cleave into octahedrons and tetrahedrons by removal of the solid angles. These crystals, collected in gronps, their faces presenting a fine splendent lustre, and some brilliant shade of red, blue, green, or purple, constitute some of the most beautiful mineralogical specimens. They are sometimes transparent, but commonly translucent. They are of brittle texture, breaking into splintery and conchoidal fragments. The hardness of the mineral is 4; its specific gravity 3.14 to 3.19. Coarsely pulverized and heated, it emits phosphorescent light of various colors, which are best exhibited in a dark room. Before the blowpipe it decrepitates and fuses to an enamel. It is met with in veins in the metamorphic rocks, and in the limestones of formations as recent as the coal. In the north of England it is a common gangue of the lead veins which

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are found in the strata of the coal formation; and it is there most conveniently applied as a flux for the reduction of these ores, for which it is peculiarly adapted. The coal beds also associated with them furnish the fuel for this process. The most famous locality of fluor spar is at Castleton, in Derbyshire, England, whence the name of Derbyshire spar has been given to the mineral. It is there found in the fissures of the limestone of deep blue and purple colors, in specimens so large and beautiful, that they are wrought into vases, inkstands, cups, tables, &c., which present fine colors and polish, but which, from the softness of the stone, are liable to be soon defaced by scratches. The blue color is often so intense that the articles cannot be worked thin enough to exhibit the shade; but by heating the stone nearly red hot, the intensity diminishes, and the blue changes to amethystine. By continuing the heat the color disappears. The workmen call the stone blue John. They chip the rough block into a rude shape with a steel point and mallet, and then heat it, so that on applying rosin over its surface, this will fuse and penetrate slightly into the mass, the object of which is to check the tendency to cleave as the stone is afterward worked in the lathe; and as the particles are removed in this operation, the rosining is occasionally repeated. The manufacture is described as a difficult one, from the crystalline structure with its fourfold cleavage causing the laminæ to split up in unexpected places. The best workmen often fail in turning very thin hollow articles. Fluor spar is found at many localities in the United States, but has been very little used for practical purposes. Fine crystals, commonly of green color and very large size, are found in different places in Jefferson and St. Lawrence counties, N. Y., and at Rossie they have been used as a flux in smelting the lead ores found there. In Illinois, below Shawneetown on the Ohio, it is found in large purple crystals, with the same associations of lead ores and coal that accompany it in the north of England. The lead veins of the metamorphic rocks of New England often contain it as one of the gangues. From fluor spar is obtained fluorine, which, combined with hydrogen in the form of hydrofluoric acid, is used to etch glass.

FLUORESCENCE, an appearance of emitted light from certain bodies, solid or liquid, due to impingement on such bodies of differently colored light, or of chemical rays. The solar beam is a sheaf of rays of 3 kinds: 1, thermal rays, invisible; 2, luminous rays, visible; 3, actinic or chemical rays, invisible; and of these 3 kinds the degree of refrangibility is in the order in which they are here named. The first and third of these also overlap and mingle with the luminous. Again, a beam of light transmitted through a medium is seen only in the line of emergence; or if the medium be colored, and the illuminated portion give out light in all directions, this has in all ordinary cases the color of the medium. The phenomena now to be detailed furnish a marked exception to the principle just stated; and they are among the most significant of modern optical discoveries.—Sir David Brewster, in 1833, having thrown a beam of sunlight, concentrated by a lens, through an alcoholic solution of chlorophyl contained in a transparent vessel, found that while the emergent beam was, as should be expected, of the color of the solution—a fine emerald green—the path of the beam through the liquid was marked to a certain depth by a bright blood-red light, which was emitted in all directions. Supposing this effect due to a reflection of part of the admitted light by minute solid particles suspended in the liquid, he termed the phenomenon one of internal dispersion. He discovered similar results in fluor spar and some other media; the new colors, however, not being always the same. In 1845 Sir John Herschel found that a weak solution of bisulphate of quinine, about 1 part of the salt to 200 of water, acidulated by addition of a little sulphuric acid, when viewed by transmitted solar light, appeared colorless; but that, at the same time, it emitted from a thin stratum at the surface at which the beam entered a beautiful sky-blue light, which in various other directions was seen as if emanating from the liquid. Beyond the thin stratum thus seen, the peculiar blue rays no longer marked the course of the beam, nor did they appear in a second or third medium of the same kind into which the beam was successively passed; whence it was evident that at a certain depth the beam had lost the power of exciting them. Herschel, therefore, proposed for the phenomenon the name of epipolic (surface) dispersion. The character of the change occurring was not understood until, in 1852, Prof. Stokes submitted the subject to a more careful investigation. He reasoned that the facts observed by Brewster and Herschel were the same, the rays which produced the red dispersed light possessing the power of penetrating to a greater depth before being exhausted than did those producing the blue. The latter he found to be exhausted within a film about $\frac{1}{16}$ of an inch thick, but the blue light to which they gave rise traversed the liquid with perfect freedom; hence there must be a difference of nature between the producing and the produced rays. Such differences could, probably, only be explained by polarization or change of refrangibility; but the supposition of polarization was found untenable, and the case was not one of phosphorescence. In order to test the remaining hypothesis, Stokes obtained a pure luminous spectrum by means of an achromatic lens and two or more flint-glass prisms, and in place of receiving the colors on a screen, held the quinine solution in these successively. In the less refrangible colors no effect was observed; but at about the middle of the violet space the blue diffused light made its appearance at the entering surface, as if the liquid medium had there become self-luminous.

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This result appeared in all parts of the upper violet, and until the tube had been carried to some distance into the ordinarily dark space beyond, occupied by the chemical rays. The depth of the stratum thus luminous at first exceeded the thickness of the vessel used, but it rapidly diminished in the upper parts of the space to a minute fraction of an inch. The blue light, turned aside and again dispersed by a prism held obliquely in its course, yielded in some degree rays having various refrangibilities, with color corresponding, the higher colors being most abundant. By other experiments, also, the blue dispersed light was separated from the inducing violet rays; and it was found that the former always corresponded to a band of colors below the place of the latter. The light thus acted on, then, had its refrangibility always lowered. Thus the remarkable conclusion was arrived at, that, by passing light through particular media, certain rays belonging to the violet space have their refrangibility, and of course their color, let down in the scale, while portions of the invisible chemical rays in like manner become let down so as to fall within the range of visibility, and to appear as colored light. In the undulatory theory, these results are explicable only by an increase of the wave-length and time of vibration, with a consequent diminution of the velocity of the rays thus affected. The case is one of degradation of light; in the chlorophyl solution there is a fall from higher colors to red; in the quinine solution, from invisible or violet to a mixture whose predominant hue is blue; in canary glass, colored yellow by oxide or salts of uranium, from invisible or violet to green. The striking feature in these results is the conversion of the unseen ray-power, which ordinarily induces chemism only, as in the decomposition of carbonic acid and fixation of carbon within the green leaves of plants, and in the blackening of the photographic plate, into common light, thus proving the intimate relation, if not the identity, of the two. Stokes has given to the phenomenon the name of fluorescence, as having been seen in fluor spar; and this name, conveying no theory of the case, is preferred. It is conveniently observed by pencilling over, by candle light, a sheet of white paper with the quinine solution, or by tracing with it letters on the paper; nothing unusual is observed on the paper, which is as white as before, until it is brought into some light well supplied with chemical rays, and not too brightly luminous for witnessing the effect (as into a beam in an otherwise dark room), when fluorescence appears; and when in such a room the beam is decomposed, the luminous spectrum hidden from the view, and the paper brought into the ultra-violet space (which is of itself, of course, dark), its sudden lighting up with a pale blue radiance is an effect apparently little short of the supernatural. Other fluorescent media are infusion of horse-chestnut bark, or its active principle, æsculine, the infusion of seeds of *datura stramonium*, tincture of turmeric, &c. Gas and candle light excite little or no visible fluorescence; hence these are poor in actinic rays. The flames of hydrogen and of sulphur burning in alcohol give very distinct results; hence these abound in those rays. But so rich in this respect is the light of the voltaic arc from metallic points, that it produces fluorescence through a space 6 or 8 times the length of the luminous spectrum. It is worthy of remark, however, that the fluorescent space can be detected to any considerable distance above the violet, only when the prisms employed are of quartz; glass at once cuts down the effect within narrow limits, proving that it is highly opaque to the chemical rays, for which quartz serves as the true glass. In 1858 Mr. Robinson of Armagh found the light of the aurora borealis to produce, for its intensity, very marked fluorescence —another fact favoring the electrical origin of that phenomenon.—M. Niepce, the younger, claims (1859) that he has preserved during 6 months the photogenic power of light, in card paper impregnated with tartaric acid or nitrate of uranium, exposed for half an hour to sunlight, and then at once sealed up in a tin tube. It is certain that, at the end of this time, this card removed in the dark, placed over sensitized or photographic paper, with a partially translucent drawing or printed sheet interposed, and left so for many hours, gives a very good negative picture on the sensitized paper, the latter being darkened through the lights, and protected by the shades of the interposed figure. It is yet, however, a question whether this effect is due to preserved light, or rather actinism, or to the effect of hydrogen gas set free from compounds in the prepared card, and acting chemically on the photographic paper. Invisible drawings in fluorescent substances, exposed to the sun and immediately or soon after applied in the dark, acted more powerfully; but interposed fluorescent bodies, as well as glass, arrested the action.

FLUORINE, a colorless or yellowish gaseous body separated from fluor spar or fluoride of calcium by the action of sulphuric acid. It is regarded as an elementary substance, and its chemical equivalent, calculated from the supposed simple combination of one atom each of calcium and fluorine in fluor spar, is given as 19. It is found in the teeth and bones of animals, in sea and some mineral waters, and in many phosphates and other minerals. On account of the great difficulty of preventing fluorine, when driven from its combination with one substance, from immediately combining with any other with which it comes in contact, it has been impossible to investigate its qualities in its isolated state, and hence the slight uncertainty as to its elementary nature. Louyet obtained it by decomposing dry fluoride of silver by means of chlorine gas in vessels of fluor spar. He found the dry gas possessed affinities analogous to those of oxygen and sulphur; it acted upon almost all metals, but attacked glass feebly or

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not at all. Combined with hydrogen in the form of hydrofluoric acid, however, its most remarkable property is its rapidly corroding this substance; and for this reason it is the agent employed for etching glass, as in marking thermometer and other graduated tubes, the bottles of chemists and apothecaries, &c. Its presence is detected in any body supposed to contain it, by submitting this in a vessel of platinum or lead, which are but slightly affected by the acid, to the action of concentrated sulphuric acid, and placing a plate of glass across the mouth of the vessel to receive the vapors evolved on the application of a gentle heat. This is the process by which hydrofluoric or fluohydric acid is obtained from fluor spar, the metallic vessel being a retort, furnished with a crooked neck of lead, in which the vapor condenses in the water placed in the bend to receive it, and which is kept cool by being surrounded with ice. It may also be obtained by condensing the vapors without the use of water in the lead tube; in this state it is called anhydrous fluohydric acid. It is a colorless fluid, of specific gravity 1.06, boils at 86°, and cannot be made to congeal at any temperature. It has a strong affinity for water, its vapor rising and forming thick white fumes as it combines with the moisture in the air, until by dilution this action at last ceases. Dropped into water, a sound is produced with the fall of each drop, as if it had been red-hot iron. When diluted with water it is highly corrosive, and according to its strength may produce injury by touching the skin. A single drop of the anhydrous acid may produce acute inflammation accompanied with fever. The marks made by the gaseous acid when used for etching are fine and visible on account of their opacity, while those produced by the liquid are transparent, and must consequently be deeply etched. The product of this action of the hydrofluoric acid upon silicious substances is the gaseous compound known as fluosilicic acid or fluoride of silicium; and thus is a means afforded of volatilizing silica and removing it from some of its combinations, by which their analysis is facilitated.

FLUSHING, a post village and township of Queens co., N. Y.; pop. in 1855, 7,970; distance from N. Y. city abont 8 miles. It is situated at the head of a bay of the same name opening into Long Island sound, and has daily communication with New York by railroad and steamboat. In 1855 it contained 10 churches (1 Congregational, 2 Friends', 3 Methodist, 2 Episcopal, 1 Reformed Dutch, and 1 Roman Catholic), several schools and seminaries, 2 newspaper offices, and a number of extensive nurseries and gardens, which are visited by multitudes of persons from the neighboring cities.

FLUSHING (Dutch, *Vlissingen*), a fortified town and seaport of Holland, in the island of Walcheren, province of Seeland, on the N. shore of the estuary of the W. Scheldt, 50 m. S. W. of Rotterdam; pop. about 8,000. It is well built, and contains several churches, schools, and charitable institutions, 5 market places, extensive dockyards, a town hall, and an exchange, near which is a statue of Admiral de Ruyter, who was a native of this place. The principal manufactures are beer, soap, and oil; but the inhabitants are chiefly engaged in commerce, and branches of industry subsidiary thereto. The port of Flushing is formed by 2 moles which break the force of the sea. The town is connected with the river by 2 large and deep canals, one of them being navigable for first-class merchant ships. The French took possession of the town in 1795, and made it a principal station for their fleets. In 1809 it was bombarded and taken by the British under Lord Chatham, but was soon after evacuated. It is the seat of an admiralty board.

FLUTE, a wind instrument, which under different forms and names has been in use for more than 4,000 years. It was familiar to the Egyptians from a remote period of their history, and among the Greeks and Romans was a favorite pastoral instrument, employed also on sacred and festive occasions, in military bands, and at funerals. Its present name is derived from the Latin *fluta*, meaning a lamprey, an eel caught in the Sicilian waters, whose side is perforated with 7 holes like the flute. The Egyptian flute was from 2 to 3 feet long, and was generally played by the performer sitting on the ground; while that of the Greeks probably did not exceed, if it equalled, a foot in length. At Athens it was once in great repute, but was finally superseded by the lyre, the use of which did not distort the face, while it allowed the accompaniment of the voice. In Thebes, Sparta, and other places, however, it continued a favorite. The Spartan flutists were a hereditary order, and the Spartan soldiers are said to have marched to battle to the sound "of Dorian flutes and soft recorders." The Egyptians appear, from their ancient pictures and sculptures, to have blown the instrument through a lateral opening near one end, and to have produced the necessary modulations of sound by means of holes on the side; hence their instrument probably differed little from the modern fife. The flute of the Greeks and Romans was probably more in the nature of the pipe, and was double as well as single, being often composed of 2 tubes of reed or wood, perforated with holes and played together. Until the early part of the 18th century it retained the form of the pipe, and was called the English or common flute, and sometimes the *flûte à bec*, from the resemblance of the mouthpiece to the beak of a bird. It was played in the manner of the clarinet, and had 7 finger holes, but no keys. This gave place somewhat more than a century ago to the German flute, which in its most perfect form consists of a tube of hard wood or ivory about 27 inches in length, separable into 4 joints, and having from 6 to 12 finger keys for semitones. It is blown through a lateral hole at one end, and has a compass of nearly 3 octaves, from C below the treble staff to C in altissimo. The modern flute is highly effective in an orchestra,

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but has fallen into some disrepute for the performance of solos, in consequence of the flimsy and tasteless character of the music too frequently written for it, and which serves to exhibit the skill of the player rather than the capacity of the instrument.—The OCTAVE FLUTE, called also the *piccolo*, is a small shrill instrument of the flute species, an octave higher than the common flute. Its piercing sounds are only effective in a large orchestra or in military bands. —FLUTE STOP, on the organ, a range of pipes tuned in unison with the diapason, and intended to imitate the sounds of the flute.—One of the best German flutists of the 18th century was Quantz, the flutist of Frederic II. of Prussia. Devienne (died in 1802) and Berbiguier acquired a high reputation in France; and among the great flutists of the present century in Germany were Fürstenau and his son (died respectively in 1819 and 1852), and in England Charles Nicholson, whose father had also been celebrated in the preceding century. Among celebrated living flutists are the following: Theobald Böhm, flutist of the king of Bavaria, born about 1802, who invented about 1833 a new flute known as the Böhm flute, which is said to combine improvements in nearly every part of the instrument, and wrote in 1847 a treatise on recent improvements in the manufacture of flutes, which was translated into French (*De la fabrication et des derniers perfectionnements des flûtes*, Paris, 1848). His new flute, at first neglected, is now almost generally adopted. Jean Louis Tulou, born in Paris in 1786, and professor of the conservatory there. Louis Drouet, born in Amsterdam in 1792, for some time Tulou's rival in Paris, has resided since 1881 in Belgium engaged in manufacturing musical instruments. The principal flute manufacturers of the present day are Koch and Ziegler, Vienna; Clair Godfroy, Paris; and Rudall, Rose, Carte, and co., London.

FLUVANNA, a central co. of Va., bounded S. by James river, and intersected by the Rivanna; area, 170 sq. m.; pop. in 1850, 9,487, of whom 4,737 were slaves. Between the rivers there are some level tracts, but elsewhere the surface is generally rough. The soil of the river bottoms is fertile; in many other parts it is sterile. Gold is found in the vicinity of Palmyra, the capital. The productions in 1850 were 1,054,974 lbs. of tobacco, 200,174 bushels of Indian corn, and 92,657 of wheat. There were a number of mills and factories, 14 churches, and 355 pupils attending public schools; value of real estate in 1856, $2,106,489. The James river canal passes along the border of the county. Fluvanna was formed from Albemarle co. in 1777.

FLUX (Lat. *fluo*, to flow), a substance used to facilitate the fusion of minerals, and frequently their decomposition. A great variety of materials serve this purpose, and one or another is used according to the nature of the body to be treated, and the chemical action desired. Some by their ready fusibility induce the same condition in bodies in contact with them, which are difficult to melt; others, though they may be as infusible as the compounds they are brought in contact with, present ingredients which possess affinities for some of those in the body to be acted upon, and fusion then takes place with mutual decomposition and recombination of elements. Thus in treating the common silicious ores of iron, which are extremely difficult to melt, limestone, still more infusible, is employed, and the lime uniting with the silica enters at once into fusion, while the oxide of iron, freed from its original combination, is at the same time decomposed by the carbon of the fuel combining with its oxygen, and the iron flows free. The carbon itself may be regarded also as a flux, its action being to facilitate this process in the same manner as the limestone does. Should the iron ores be calcareous, the mineral flux to aid their decomposition must be silicious, that the same fusible silicates may be produced. Borax is a flux of very general application, from the readiness with which it forms fusible compounds with silica and other bases. The subject will be considered, as to the application of particular fluxes, in describing the metallurgic treatment of the ores of the various metals. (See also BLACK FLUX, and BORAX.)

FLUXIONS. See CALCULUS, and DIFFERENTIAL CALCULUS.

FLY, the popular name of the *diptera*, or two-winged insects, of which a familiar example is the common house fly. They have a sucking proboscis, 2 veined and membranous wings, and 2 poisers behind the wings; they undergo a complete transformation. The characters of the order have been sufficiently detailed in the article DIPTERA, and therefore only some of the most common flies of the family *muscadæ* will be noticed here. The house fly (*musca domestica*, Linn.) of Europe is considered distinct from the American species by Dr. Harris, who calls the latter *M. harpyia*; it begins to appear in houses in July, sometimes a little earlier, becomes very abundant toward the end of August, and does not disappear until killed by cold weather; the eggs are deposited in dung, in which the larvæ undergo their transformations; consequently this species is most numerous in the vicinity of stables and unclean places. The swarms of summer are doubtless the progeny of a few individuals which have survived the winter in some protected nook, and are not produced from eggs laid the preceding season; it is possible that a few may pass the winter in the pupa state, and be developed by the warmth of spring. Among the thousands of domestic flies, all are of the same size, those larger or smaller being of different species, and neither very old nor very young individuals of the *M. domestica*; the house fly is such a constant companion of man, that its presence in a coral or other island is sufficient evidence that human inhabitants are not or have not been far distant. This common and despised creature offers to the microscopist and naturalist some of the most striking proofs of creative design. The 2 compound eyes contain as many as 4,000 facets,

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each the cornea of a separate *ocellus;* the spiracles through which air enters the tracheæ are provided with a kind of sieve formed by minute interlaced fibres, which prevents the introduction of dust and foreign substances; the *ligula*, or prolongation of the anterior portion of the lower lip, commonly but improperly called the tongue, forms the chief part of the proboscis, which receives as its upper portion the lancet-like organs formed by the pieces of the upper jaw; by this proboscis the fly sucks up fluids, and substances like sugars, which it dissolves by means of a kind of saliva poured through its channel. It is well known that flies, and many other insects, have the power of creeping up smooth perpendicular surfaces, and of walking on ceilings with their backs downward. The last joint of the tarsus is provided with 2 strong hooks, and a pair of membranous expansions (*pulvilli*), beset with numerous hairs, each having a minute disk at the extremity. There has been considerable difference of opinion as to the precise mode in which this apparatus enables the fly to walk in opposition to the force of gravity. Derham, Home, Kirby, and Spence believed that the pulvilli act as suckers, a vacuum being formed beneath, and the insect is held up by the pressure of the atmosphere against their upper surface; others have maintained that the adhesion is due to a viscid liquid secreted from the bottom of the foot. Dr. Hooke and Mr. Blackwall assert that the soles of the feet are so closely beset with minute bristles that they cannot be brought in contact with any surface so as to produce a vacuum, and believe that the support is owing to the strictly mechanical action of these hooks. Mr. Hepworth ("Journal of Microscopical Science," vols. ii. and iii.) reconciles these apparently contradictory opinions by the conclusion that the minute disks at the end of the individual hairs act as suckers, each of them secreting a non-viscid liquid, which renders the adhesion perfect —a structure which exists on a larger scale in the feet of *dytiscus* and other beetles. Mr. White, in his "Natural History of Selborne," observes, in confirmation of the views of Derham, that, toward the close of the year when flies crowd the windows in a sluggish and torpid condition, they are hardly able to lift their legs, and many are actually glued to the glass, and there die from inability to overcome the pressure of the atmosphere. It is well known that some lizards possess a similar faculty, and a similar apparatus to account for it. Though bred in filth, and living in unclean places, the fly delights to brush off the dust by rubbing its feet together, and to clean its eyes, head, corslet, and wings by its fore and hind legs; this process, which resembles that adopted by cats for a similar purpose, may be seen in sunny places on any summer's day. Untidy housekeepers are generally troubled with swarms of flies, which cover every article of food by day and the walls by night; in addition to keeping rooms dark and putting eatables beyond their reach, a dish of strong green tea, well sweetened, will be eagerly tasted by them, and prove a certain poison; according to Mr. Spence, a netting of large meshes stretched across a window of a room lighted only on one side will not be passed by flies. —The blue-bottle or blow fly (*M. (calliphora) vomitoria*, Linn.) is a large, buzzing species, of a blue-black color, with a broad, steel-blue, hairy hind body; it is found in summer about slaughter houses and all places where meats are kept, which it frequents for the purpose of depositing its eggs on animal substances. The eggs, usually called fly blows, are hatched in 2 or 3 hours after they are laid; the larvæ increase so rapidly in 3 or 4 days, and are so voracious, that Linnæus did not greatly exaggerate when he said that the larvæ of 3 females of this species will devour the carcass of a horse as quickly as would a lion; they pass the pupa state in the ground or in some crevice, the larval skin not being cast off, but changed into an egg-shaped case; from this they emerge as flies in a few days, or, if hatched late in the season, remain unchanged through the winter. A smaller, brilliant, blue-green fly, with black legs, much resembling the *M. (lucilia) Cæsar* of Europe, lays its eggs on meat and the carcasses of animals.—The flesh fly (*sarcophaga carnaria*, Meig.), somewhat longer than the blow fly, is ovo-viviparous, that is, it drops the living larvæ on dead and decaying animal matter, a wise provision which enables these active little scavengers to commence at once their work of purification. A single female will produce about 20,000 young, which have been ascertained by Redi to increase in weight nearly 200 fold in 24 hours; Réaumur found the assemblage of embryo flies in this insect to be coiled like a watch spring or a roll of ribbon, when unrolled about 2½ inches long; the larvæ arrive at maturity in succession, and the mother as usual dies soon after the brood is hatched. The color of this European species is black, with lighter stripes on the shoulders, and grayish black abdomen checkered with lighter squares. Another species of Europe is the *S. mortuorum* (Linn.), 5 or 6 lines long, with a golden head, grayish black thorax, steel-blue abdomen, and white wing scales. Both of these sometimes deposit their young on wounds and ill-conditioned ulcers of the living human body, as most surgeons have had occasion to witness. The largest American species is the *S. Georgina* (Wiedemann), the females of which are about ¼ an inch long; the face is silvery white, with a black spot between the copper-colored eyes; the thorax light gray, with 7 black stripes; the hind body, conical and satiny, is checkered with black and white; they appear about the end of June, and continue till after the middle of August. In this genus the bristles on the antennæ are plumose.—The dung fly (*scatophaga stercoraria*, Meig.), of a yellowish olive color, deposits its eggs in soft dung; at the upper end they have 2 divergent processes which prevent

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their sinking too far into the nidus. The *S. furcata* (Harris) of the United States has the same habits, and has been erroneously charged with producing the potato rot, simply because the larvæ are found upon the stalks of this plant, developed from eggs laid in the surrounding manure. The males are yellow, with hairy body and legs, and long narrow wings, and are about ½ as large as a honey bee; the females are smaller, less hairy, and olive colored; both young and adult insects live upon dung, and do not injure plants.—The stable fly (*stomoxys calcitrans*, Meig.) is a well-known tormentor of animals and man, whose skin it perforates by a painful bite in sultry weather and just before rains; it resembles very closely the house fly, except that the antennæ are feathered, the proboscis very long and slender, and the size smaller; it attacks the legs, piercing through thick stockings and the thickest hair, returning to the attack as soon as driven away; it is solitary, not social like the house fly, and seldom enters houses unless driven in by bad weather; it is most abundant in August and September, when it is a great pest to horses and cattle; it is about ¼ of an inch long, and lays its eggs in dung, in which the young are hatched and undergo their transformations;—The cheese fly (*piophila casei*, Fallen.) is only $\frac{2}{16}$ of an inch long, of a shining black color, with transparent wings and yellowish hind legs. By its long ovipositor it penetrates the cracks of cheese, and deposits about 250 eggs, which are developed in a few days into maggots or skippers; these larvæ have 2 horny hooked mandibles, which they use for digging into the cheese, and for locomotion instead of feet; their proportions are considered so elegant and so characteristic of design that Swammerdam lays stress upon them as proofs of creative power and wisdom. The cheese skipper leaps 20 or 30 times its own length, first erecting itself on the tail, then bending into a circle and seizing the skin near the tail with its hooked jaws, and finally projecting itself forward by suddenly throwing itself into a straight line. The droppings and decay caused by these larvæ give a flavor to old cheese which is much relished by epicures. —There are several species of flower flies, of the genus *anthomyia*, of small size and feeble flight, which sport in the air in swarms like gnats, and which in the larva state are very injurious to vegetation; some of these maggots are like those of common flies, others are fringed on the sides with hair. The *A. ceparum* (Meig.), of an ash-gray color, with black dorsal stripes, and about ¼ the size of the house fly, lays its eggs on the leaves of the onion close to the earth; its smooth white larvæ bore into the bulb, and entirely destroy it. The *A. brassicæ* and *A. lactucarum* are equally destructive to the cabbage and lettuce; the *A. raphani* (Harris) attacks in the same way the radish. The *A. scalaris* and *canicularis* give rise to fringed maggots, which have been not unfrequently ejected from the human body, having probably been swallowed with vegetables in which decay had commenced; as the eggs in many instances belong to species depositing in the ordure of privies, the larvæ might remain alive for a considerable period in the intestines of man; eggs of other *muscadæ* might be introduced on meats, fruits, salads, vegetables, and in impure water. In the "Transactions" of the entomological society of London (vol. ii., 1837), Mr. Hope gives a tabular account of 37 cases in which maggots of the *muscadæ* infested the human body, many of which were recognized as belonging to *M. domestica*, *C. vomitoria*, and *S. carnaria;* and many cases have since been recorded in medical journals.

FLYCATCHER, the popular name of many dentirostral or tooth-billed birds, of the order *passeres* and family *muscicapidæ*. They have bills of various lengths, generally broad and flattened at the base, with the culmen curved and the sides compressed to the emarginated tip; the gape is furnished with long and strong bristles, for the easier securing of their flying prey; the wings are usually long, as also is the tail; the tarsi short and weak; the toes long, the outer generally united at the base. The family, according to Gray, contains the following sub-families: *querulinæ*, or mourners, of tropical America; *alectrurinæ*, peculiar to South America; *tyrannina*, or tyrants, American and principally tropical; *tityrinæ*, or becards, of tropical America; *muscicapinæ*, or flycatchers, found the world over; and the *vireonina*, or greenlets, American. The sub-family *muscicapina* includes the following genera: *conophaga* (Vieill.), with 7 species, found in the thick woods of tropical America; *platyrhynchus* (Desm.), with about 20 species, in the brushwood and trees of tropical America; *platysteira* (Jard. and Selby), African, with a dozen species; *todirostrum* (Less.), with 15 species, South American; *muscivora* (Cuv.), 3 species, South American; *rhipidura* (Vig. and Horsf.), 40 species, found in India and its archipelago, New Zealand, and Australia; *tchitrea* (Less.), 20 species, in Africa, India, and its archipelago; *monarcha* (Vig. and Horsf.), 10 species, in Australia and the islands of the Indian ocean; *seiaura* (Vig. and Horsf.), 3 Australian species; *myiagra* (Vig. and Horsf.), 14 species, in Australia and India; *hemichelidon* (Hodgs.), 2 species, in the hills of Nepaul; *niltava* (Hodgs.), 20 species, in India and its archipelago; *muscicapa* (Linn.), with 70 species, in most parts of the old continent; and *setophaga* (Swains.), nearly 20 species, in North and South America. The last is a very active genus, pursuing swarms of flies from the top to the bottom of a tree in a zigzag but nearly perpendicular direction, the clicking of the bills being distinctly heard as they snap up the insects in the course of a few seconds; the American redstart, (*S. ruticilla*, Swains.), placed in the family *sylvicolidæ* by Prof. Baird (in his Pacific railroad report), is a good example of the genus.—There is probably no family of birds about which systematic writers on ornithology differ more than

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on that of the flycatchers; and to attempt here to follow the subject to anything like a satisfactory result would be alike tedious and unprofitable, and would after all be little else than a question of authority in the science. As far as the American flycatchers are concerned, it will be sufficient to give Prof. Baird's classification in the report above cited. He follows Burmeister in adopting the order *insessores*, and Cabanis in placing most of them in the sub-order *clamatores;* he calls the whole family *coleopteridæ*, of which the sub-family *tyrannina* is what chiefly interests us here. The fork-tailed and swallow-tailed flycatchers belong to the genus *milvulus* (Swains.); the Arkansas, Cassin's, and Couch's flycatchers to the genus *tyrannus* (Cuv.); the great crested, Mexican, Cooper's, and Lawrence's, to the genus *myiarchus* (Cab.); the black, pewee, and Say's, to the genus *sayornis* (Bonap.); the olive-sided to the genus *contopus* (Cab.); Traill's, the least, the small green-crested, and the yellow-bellied, to the genus *empidonax* (Cab.); the last 4 genera are included in the genus *myiobius* of Gray. The Canada and Bonaparte's flycatchers are warblers, belonging to the genus *myiodioctes* (Aud.) or *setophaga* (Swains.); the solitary, white-eyed, warbling, yellow-throated, red-eyed, Hutton's, and the black-headed flycatchers are vireos; the blue-gray flycatcher belongs to the family of titmice, and to the genus *polioptila* (Sclater.). The flycatchers are active and fearless birds, and tyrannize over the insect world as the hawks do over weaker and smaller birds; they are very beneficial to man by destroying flies, moths, and various insects and grubs injurious to vegetation, and annoying to animals.

FLY WHEEL, a large heavy wheel attached to machinery and running with it for the purpose of equalizing the power and the resistance, and producing uniformity of motion when the power is unevenly applied, or when the resistance is greater at intervals. If power be applied to cause a heavy wheel to revolve, this power, slowly accumulated, is slowly expended in the continued revolution of the body. The momentum of the wheel carries it on when the power ceases to be applied, maintaining uniformity of motion if the application be by impulses, and carries it also without apparent retardation past the dead points of the machinery, overcoming any sudden increase of resistance. Thus the fly wheel distributes the power uniformly, and is of great importance as a regulator in all works where the demands upon the machinery are very irregular, or where the power applied is not uniform. In large engines it is commonly made to run separate from the rest of the machinery, though connected with it. In smaller engines it is often the main driving wheel, the power being communicated directly either by gearing or by a belt. If the power is variable, the fly wheel should be as near as possible to the prime mover; if the resistance is variable, it should be near where this is met, thus avoiding the strain on intermediate shafts.

FLYING FISH (*exocætus*, Linn.), a genus of fishes belonging to the order *pharyngognathi* and the family *scomberesocidæ* (Müller), containing, according to Valenciennes, 33 species. This genus is at once recognizable by its large pectoral fins, capable of being used as parachutes, and to a certain extent as wings; other fish have the faculty of leaping out of the water and of sustaining themselves in the air for a short time, but the *exocæti* far excel these, and approach much nearer in this act the true flight of birds than does the flying dragon or the flying squirrel. Navigators in all tropical seas are familiar with these sprightly fishes, which relieve the monotony of ocean life as birds do the silence of the woods. The characters of the long pectorals, the strength of the muscles which move them, and the size of the bony arch to which they are attached, are the essential conditions of their flight, which is not always to escape their enemies, as has been generally believed, but also to fulfil the end of their curious organization; though undoubtedly intended in part as a means of safety, numerous observations prove that these shining bands pursue their flights when no danger threatens, in the full enjoyment of happiness and security, for mere sport, and probably as a necessity of their structure. Their lot indeed would be far from enviable, were their flights the frantic attempts to escape from pursuing bonitos and dolphins (*coryphæna*), for in the air their danger is quite as great from the albatross, frigate pelicans, petrels, and other ocean birds; but it cannot be that this beautiful provision is wholly devoted to avoiding such dangers; this habit belongs to the same class of phenomena as the flying of the dragon and squirrel, the climbing of trees by the anabas, and the travelling across the land by the common eel. Humboldt, 60 years ago, drew attention to the great muscular force necessary for the flight of these fish; he recognized that the nerves supplying the pectorals are 3 times as large as those going to the ventrals; the muscular power is sufficient to raise them 15 or 20 feet above the surface, and to sustain them with a velocity greater than that of the fastest ship for a distance of several hundred feet. The pectorals strike the air with rapid impulses, scarcely more perceptible than the quick vibrations of the humming bird's wing. Humboldt states that they move in a right line, in a direction opposite to that of the waves, but other observers assert positively that they can turn nearly to a right angle from this course before settling into the water again; though they generally come out on the top of a wave, they can pass over several of their summits before descending. The size of the swimming bladder is enormous, occupying more than half the length of the body; though this, not communicating with the intestine, is of no advantage in making the exit from the water, it contributes to prolong the flight by rendering the body more buoyant. The flying faculty of these fish, the pleasing spectacle of

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their troops sporting around the bows of vessels, the glittering of their beautiful colors in the tropical sun, the delicate flavor of their flesh, and the fact of their frequently leaping on board ships, have attracted the attention of mariners from early times; but until a comparatively recent period only 2 species were admitted by naturalists, who gave them a distribution as wide as the tropical and temperate seas. The order to which the flying fish belongs is characterized by having the lower pharyngeal bones united to form a single bone. The generic characters of *exocœtus* are: a head and body covered with scales, with a scaly keel on each flank; the pectoral fins nearly as long as the body; the dorsal over the anal; the head flattened, with large eyes; both jaws with small pointed teeth, and the pharyngeals with numerous compressed ones; upper lobe of the tail smaller than the lower; the fins without spines; the intestine straight, without pyloric cæca.—The common flying fish of the Mediterranean (*E. volitans*, Linn.) is recognized by its long white ventral fins; the body is generally short and thick, robust in the pectoral region, rounded above, flattened on the sides; the head is large, the muzzle obtuse, the lower jaw the longer, the mouth small, the teeth in the anterior part of the jaw, the palate smooth, the tongue free, the gill-openings large, and the branchial rays 10 to 12; the humeral bones are large and firmly articulated to the head, and the pectorals, which are attached to them, are so arranged that when the flexors contract the fins are spread horizontally, and are applied along the sides when the wings are shut; the movements do not differ from those of other fishes except in the freedom permitted by the articulation; the fin rays are very long, and not deeply divided; the ventrals, inserted in front of the middle of the body, are completely abdominal and well developed; the dorsal is small, low, and triangular; the anal very short, and the caudal deeply forked; the swimming bladder extends along the spine even under the last caudal vertebræ, protected by their lower bony arches, a disposition found in no other fish. The general color is a leaden gray, with greenish tints on the upper half of the body, and silvery white below; the pectorals have a wide whitish border; the dorsal is gray, the caudal brown, the anal bluish, and the ventrals whitish. The largest specimens are rarely more than 16 inches long, and they are found in all parts of the Mediterranean. The *E. evolans* (Linn.) is found in so many parts of the world, that it may be called cosmopolitan; specimens have been obtained from the Mediterranean, the coast of France and England, the Gulf stream in the neighborhood of Newfoundland, the West Indies, the east coast of South America, the Cape Verd islands, the tropical parts of the Atlantic, Pacific, and Indian oceans, Australia, New Zealand, and the Polynesian islands. The average length is between 8 and 9 inches; the eye is of moderate size, the teeth very small, the dorsal and anal fins long and low, the pectorals extending to the caudal, the ventrals very short and attached to the anterior third of the body; the color on the back is rich ultramarine blue, and silvery on the abdomen; the fins are of a darker blue, the pectorals being unspotted. There are 5 species on the coast of North America, which have recently been divided into 3 genera by Dr. Weinland. The common species (*E. exiliens*, Gmel.), found from the gulf of Mexico to the coast of New Jersey, is from 12 to 16 inches long, with dusky pectorals and ventrals, banded with brown in young specimens; the ventrals are longer than the anal, and nearer the vent; the dorsal and lower lobe of the caudal are spotted with brown and black. The New York flying fish (*E. Noveboracensis*, Mitch.), about a foot long, has been found from the middle states to Newfoundland; the color above is dark green, the pectorals brown with the end bordered with white; the ventrals are very long, nearest to the vent, and the wings reach to the tail.—Some species have the lower lip much developed, with one or two tough appendages hanging from the chin; these have been separated as the genus *cypselurus*, and include 2 species of our coast. The *C. comatus* (Mitch.) has a black cirrhus on the chin extending half the length of the body, which is about 5 inches; the pectorals do not extend to the end of the ventrals, the latter touching the caudal; it has been found from New York to the southern states. The *C. furcatus* (Mitch.) has 2 appendages from the lower jaw; it is 3 to 5 inches long, and extends from New York to the gulf of Mexico; the pectorals are large, and the ventrals very long. The middling flying fish Dr. Weinland has made the type of a new genus *halocypselus*; this species (*H. mesogaster*, Weinland) is found in the West Indies, varying in length from 4 to 7 inches; the ventrals are very short, about ¼ as long as the pectorals, situated anterior to the middle of the body, between the anus and the pectorals; the lower jaw is angular.—The flying gurnard (*dactylopterus volitans*, Cuv.), a spiny fish of the family *triglidæ* or *sclerogenidæ*, has also been called flying fish by navigators. The species has been described as occurring in the Mediterranean, in the tropical seas, in the West Indies and the gulf of Mexico, and along the American coast from Newfoundland southward; probably more than one species will be found over such an extended range. These flying fish or sea swallows behave very much like the *exocœti*, swimming in immense shoals, leaping out of the water for sport and for safety, preyed upon by marine and aërial enemies, and falling in consequence into equally cruel hands on board vessels which come within their range. From the rapid drying of their pectorals and their less muscular power, they fall into the water again sooner than do the true flying fish; their pectorals serve merely as parachutes. They vary from 6 to 8 inches in length.

FLYING SQUIRREL (*pteromys*, Cuv.; Gr.

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πτερον, wing, and μυς, mouse), a genus of the family *sciuridæ*, differing from common squirrels principally in the expansion of the skin between the fore and hind feet, by means of which the animal sails in a descending line from one tree to another, supported as by a parachute. There are 2 subdivisions of the genus: *pteromys*, with rounded tail and complicated molar teeth; and *sciuropterus* (F. Cuv.), with flattened tail and molars simple as in other squirrels. The species of the United States and the single one found in Europe belong to the last subgenus. The dentition and general appearance are like those of squirrels; the head and ears are round, and the eyes large; there are 4 elongated toes with sharp claws, and the rudiment of a thumb, on the fore feet; 5 long toes, fitted for climbing, on the hind feet; the sailing membrane is attached in front to a slender movable bone about an inch long, extending at a right angle from the hand; the membrane is hairy on both sides. The common flying squirrel (*P.* or *S. volucella*, Pallas) is about 10 inches long, of which ¼ is the tail; the color above is light yellowish brown, the tail being rather smoke-colored, and white beneath; the fur, as in all the species, is very soft and fine. It is a nocturnal animal, rarely appearing until sunset, at which time its gambols and graceful flights may be often seen in places frequented by it; the large eyes indicate its habits, which make it rather an uninteresting pet, as it is lively only at night; it is harmless and gentle, and soon becomes tame, eating the usual food of squirrels. There is nothing resembling the act of flying in its movements, as we see in the flying fish; it sails from a high to a lower point, a distance of 40 or 50 yards, and when it wishes to alight the impetus of its course enables it to ascend in a curved line to about ⅓ of the height from which it descended; running quickly to the top of the tree, it redescends in a similar manner, and will thus travel a quarter of a mile in the woods in a few minutes without touching the earth. Flying squirrels are gregarious, 6 or 7 being found in a nest, and considerable numbers in the same hollow or artificial cavity, associating with bats and other nocturnal animals; the food consists of nuts and seeds, buds, and even meat and young birds. They produce from 3 to 6 young at a time, and have 2 litters in the southern states, in May and September. This species extends from Upper Canada and northern New York to the extreme southern limits of the United States, east of the Mississippi. The northern flying squirrel (*P.* or *S. Hudsonius*, Gmel.), found from Maine to Minnesota and to the north, is considerably larger; the length of the head and body is 8 inches and the tail 5½; the color above is yellowish brown, mixed with cinereous, the hair lead-colored at the root, beneath white. It is common in Lower Canada; in the Lake Superior copper region, at any rate in the new and remote mining locations, where rats and mice have not yet penetrated, this species lives familiarly in the walls of the log cabins, coming out at night in quest of food, and sometimes committing sad havoc among the miner's scanty stores. Other American species are the *P.* or *S. alpinus* (Rich.), from the Rocky mountains, resembling the last, but a little larger, and the membrane with a straight border; and the *P.* or *S. Oregonensis* (Bach.), in Oregon and California, about the size of the northern species, with a very broad membrane. —The European species (*P.* or *S. volans*, Linn.), found in Siberia, Poland, and Russia proper, is a little larger than the *S. volucella*, whitish gray or cinereous above, and white below; it lives wholly on trees, eating the tender shoots of resinous and other trees. The species of *pteromys* inhabiting India and its archipelago attain a larger size than any of the preceding. The taguan (*P. petaurista*, Pall.) is as large as a half-grown cat; the male is bright chestnut above, and red beneath; the female brown above, whitish below. There are several species in Java, of which the best known are the *P. genibarbis* (Horsf.) and *P. sagitta* (Penn.). The former is remarkable for the radiated disposition of long slender bristles on the sides of the head; though living in a hot climate, the fur is thick and downy; the general color is gray above, with a tawny tint on the back, and white beneath; it is about as large as the common red squirrel. The second species, like the first, is rare, and lives principally on fruits; the color is brown above, and white below. Several other species are described.

FŒTUS. See EMBRYOLOGY.

FOG, a body of aqueous vapor in the atmosphere, like the clouds seen in the sky above, and distinguished from them only by its position near the earth. It forms when the conditions are favorable for rapid evaporation, and the atmosphere, already at its dew point, can contain no more vapor in an invisible state. If the quantity of vapor thus added is too great to be buoyed up in the atmosphere, the fog passes into rain. The formation of fog over bodies of water during cool nights, and especially toward morning, is explained by the air becoming chilled more rapidly than the water, when the stratum lying upon the surface of the water receives from it heat and moisture, and becoming specifically lighter, rises and mixes with the colder air above. The temperature is then reduced, and its moisture is precipitated in visible vapor. As masses of air of different temperatures are brought together by any cause and intermix, the formation of fog is a common result from the temperature of the warmer portions being reduced below the dew point. It is generally understood that the formation of fog over any moist surface is dependent upon its temperature being somewhat warmer than that of the superincumbent atmosphere, as also upon the atmosphere itself being nearly saturated with moisture. Whether this is a law of universal application appears to be rendered questionable by observations of Dr. W. M. Carpenter upon the occurrence of fogs upon our southern rivers,

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as the Mississippi, during the spring months and early part of the summer. At this season the water has the temperature of a more northern latitude, often many degrees below that of the atmosphere immediately over it, and below that over the land; yet fogs originating during the day under these circumstances are of frequent occurrence from February to May, and none are observed at this season when the water is not cooler than the air. These fogs rarely extend over the land, being almost wholly limited to the air over the river. They commence near the surface of the water, and increase in depth by additions from above. Dr. Carpenter attributes the production of the fog in these instances to the refrigeration of the air in consequence of communicating its heat to the water; this chilling gradually extends upward, notwithstanding the low conducting power of atmospheric air, and moisture is precipitated in consequence. These observations of Dr. Carpenter are contained in a paper published in the "American Journal of Science" (vol. xliv. p. 40, 1843).—The production of fog is a phenomenon of almost daily occurrence during the warm season in northern mountainous forests; and in the cool early morning succeeding a warm day, the phenomenon may be observed to great advantage from an elevated point overlooking the woods, lakes, and water courses. As the day dawns, the vapors are seen to be gathered over all the low places, and covering the moist lands and the surface of the water with an impenetrable mist. Out of this rise like islands the more elevated portions, some trees here and there taller than the rest spreading their branches and foliage above the fog, and resembling ships lying idly upon the still water, their canvas hanging loosely about the masts. As the sun rises, the tops of the mists melt away in the warmth of its rays; but in the deep valleys and under the shelter of the high mountains the fog long continues, defining by its presence the course of the streams it covers along their meanderings through the dense woods and among the distant hills. Gradually disappearing, it prevents the rays of the sun from striking too suddenly upon the moist vegetation, thus producing a rapid evaporation that would engender frosts. (See EVAPORATION, and FROST.) The warmth finally reaches the cool air that has collected in the lowest places, and the mists wholly disappear. But in very moist places, particularly over large surfaces of water, or when the day is cool and the air filled with moisture, the fog does not so readily disperse. It contends successfully with the sun, appearing and disappearing; swept away for a time by the wind, and again shrouding the surface with its dense curtain. As it lifts for a few moments, the vessels enveloped in it seize the opportunity to secure the bearings of prominent points before it again shuts down upon them. The eastern American coast in the summer months is particularly subject to fogs, the waters of the ocean continuing at a higher temperature than the land, which sooner parts with its heat to the cool breezes. They become more prevalent further eastward, and at last at the banks of Newfoundland the most favorable conditions are found for their production, in the warm waters of the Gulf stream swept around from the tropics, and meeting the air chilled by the icebergs which the polar current here discharges. The lifting of the colder waters also from the depths of the ocean upon the shoals reduces the temperature of the air, causing condensation of the vapors which rise from the warmer waters around. Fogs are also very prevalent in some portions of the equinoctial regions, particularly along the western coast of South America, where they make up to some extent the want of rain. Lima, as stated by Humboldt, is enveloped in fog the greater part of the time for 6 months together, particularly in the morning and evening.—A theory has been advanced by M. Peltier that the electric condition of the air has much to do with the production of a class of fogs, the origin of which cannot be accounted for by a difference between the temperature of the air and that of the moist surface of the earth. The opposite electrical conditions of the earth and atmosphere he regards as favoring the transfer of aqueous particles from one to the other; and when the different electrical states are very decided, the vapors rising from the surface must be hurried upward with increased force. Thus vapors may be raised into the higher regions of the atmosphere, and be brought down to the surface of other parts of the world, where their appearance cannot be accounted for by the usual cause of fogs. M. Peltier distinguishes fogs which have been produced by negative, and those by positive electricity; the earth itself being negative, the vapors that arise assume the same condition; but the particles charged with this electricity are repelled, and the strata near the surface are positive by induction. The views of M. Peltier have been received as proper subjects of speculation, without the conclusions he draws being regarded as established.—Fogs which appear suddenly without any apparent cause of difference of temperature or of being swept in by winds, and extend at once to great heights, are referred by Sir John Herschel to a fall of temperature of a mass of air, not by radiation, contact of a cold body, or mixture with colder air, "but by the simple effect of its own expansion. This may take place in two ways, viz.: 1, by a rapid and considerable relief of barometric pressure from above; or, 2, by its own ascent into a higher region of the atmosphere." Such fogs, which disappear when the atmospheric equilibrium is restored, are of the same nature as the cloud produced in the receiver of an air pump by a rapid partial expansion of the air. For these Sir John Herschel proposes the name of barometric fogs.—It is a question with meteorologists whether the particles of fog vapor are hollow or solid globules, or a mixture of both. De Saussure thought he had detected the hollow vesicles in the clouds

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upon the Alps; and Kratzenstein affirms that by examining with a microscope the vapor rising in the sunlight from the surface of hot water, he could recognize the beautiful colored rays, such as are developed at the highest point of the common soap bubble, as it floats in the rays of the sun, and which would not appear if the spheres were drops. He argues, moreover, that if the globules were solid drops, rainbows would occasionally be seen when the sun and cloud were in favorable positions relatively to the observer for their development; but this never occurs. On the other hand, Sir John Herschel states, that on descending under a full moon a few yards below the surface of the mist collected in a valley, a lunar rainbow is frequently seen; that the finest he ever saw, which was on Nov. 12, 1848, "was formed in a dense fog, evidently close at hand, and when not a drop of actual rain was falling. On this occasion the exterior or secondary bow was seen."—A thick state of the atmosphere resembling fog, except that it is not accompanied with aqueous vapors, is often seen, sometimes obscuring the heavens for weeks together, to which the name of dry fog has been given. In north Germany it was long observed to recur periodically before its course was traced to the great burnings of peat beds, which for agricultural purposes are carried on over a large extent of country, filling the atmosphere of distant regions, in the direction toward which the prevailing winds blow, with the smoky haze. The greater portion of New England has many times been covered with the same haze, the cause of which has been attributed to extensive fires spreading through the forests of Maine or of the provinces to the eastward. An extraordinary dry fog is recorded to have covered the whole of Europe in 1783 for nearly two months, which was remarkable for its acrid odor, and the blue color it imparted to objects. This was a season of terrible volcanic eruptions and earthquake convulsions in southern Italy and other parts of Europe, and the fog was no doubt the fine volcanic ashes with which the whole atmosphere was filled.

FOGARASSY, János, a Hungarian jurist, grammarian, and lexicographer, born in Kásmark in 1801. He studied at Sáros-Patak, was admitted to the bar in 1829, and held several offices before, during, and after the revolution of 1848–'9. He wrote a number of valuable judicial manuals, but is distinguished chiefly for his linguistic contributions to Hungarian literature, of which his *A magyar nyelv szelleme* ("Spirit of the Hungarian Language," Pesth, 1845) is the most important.

FOGGIA, a city of Naples, capital of the province of Capitanata, in the plain of Apulia (La Puglia), 76 m. N. E. of Naples; pop. 24,058. It is well built, with wide clean streets, handsome houses and gateways, but no walls. It has about 20 churches, and a cathedral originally Gothic, but rebuilt in a different style after its partial destruction by an earthquake in 1731. The main streets and public squares are undermined by capacious vaults called *fosse*, in which quantities of grain are stored from year to year. There are many schools, including one of agriculture and a seminary for girls. The city is surrounded by fine plantations and vineyards, but the climate is unhealthy. Foggia is supposed to have been founded about the 9th century, and peopled from the ancient Arpi or Argyrippa, 4 m. distant, the ruins of which are still visible. It was one of the favorite residences of the emperor Frederic II.

FOIL (Lat. *folium*, a leaf), the bright, highly colored metallic leaf, used by jewellers for increasing the brilliancy of pastes and inferior stones. It is made of sheet copper covered with another of silver, and rolled or hammered thin. The silver side is then burnished or varnished; and it is either so used or is coated with transparent colors mixed with isinglass size. Thin sheet copper may also be prepared by heating it between two iron plates and then boiling it in a solution of equal parts of tartar and salt. By proper care in the duration of the heating and boiling, the copper may be made to assume a white appearance, which may be rendered very brilliant by polishing with whiting upon a very smooth copper plate. (For tin foil, see Tin.)

FOIX, the capital of the French department of Ariège, and of an arrondissement of its own name, on the left bank of the river Ariége at its junction with the Arget, in a narrow valley at the foot of the Pyrénées, 404 m. from Paris; pop. of the arrondissement in 1856, 84,733, and of the town 4,612. It has considerable trade and various manufactures, the principal of which is iron. It was founded probably about the 2d century, and in the 11th century became the capital of a county of the same name, and was a stronghold of importance.

FOIX, Counts de, a French family who ranked among the most powerful in southern France, and figured conspicuously in history from the 11th to the 15th century.—Raymond Roger reigned from 1188 to 1223. He engaged in the 3d crusade among the followers of Philip Augustus, and distinguished himself by his bravery at the taking of Acre. After his return to France, he sided with the count of Toulouse and the Albigenses against the crusading forces led by Simon de Montfort, and contributed to the raising of the siege of Toulouse, during which Montfort was killed.—His son, Roger Bernard II., styled the Great, who succeeded him in 1223, followed his example, but in 1229 was forced into submission to the king and the pope.—Roger Bernard III. (1265–1302) gained considerable reputation as a troubadour, but was unsuccessful in his wars with the kings of France and Aragon; he was several times imprisoned.—Gaston II. (1329–1343) did good service to Philip VI. of France in his war with the English, and assisted Alfonso XI. of Castile against the Moors.—Gaston III., son of the preceding, succeeded his father in 1343, when only 12 years old. He was called

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Phébus on account either of his light hair or of a sun he bore on his escutcheon. He signalized himself against the English in Guienne and Languedoc, and in 1356 was imprisoned for a while at Paris, for complicity in the intrigues of Charles the Bad of Navarre, his brother-in-law. On his release he fought bravely in the ranks of the Teutonic knights against the Prussians. Returning to France in 1358, he contributed to the defeat and destruction of the rebellious Jacquerie, who were besieging the royal chateau at Meaux. In 1362, by his victory at Launac over the count d'Armagnac, he secured for himself possession of Béarn; and the magnificence of his court at Orthez and afterward at Pau was greatly admired by the chronicler Froissart. In 1380 he was appointed governor of Languedoc by Charles V., but his dignity was contested by the duke of Berry, whom he defeated at Revel. In 1382, suspecting his son of an attempt to poison him, he had him cast into prison, where the boy is said to have died of starvation. Gaston Phébus was a famous huntsman, and as an evidence of his knowledge left a book entitled *Miroir de Phébus, des déduicts de la chasse des bestes sauvaiges et des oyseaux de proie* (Paris, fol., 1507).

FOKSHANY, a frontier town of Moldavia and Wallachia, European Turkey, 92 m. N. E. of Bucharest, divided by the river Milkov into 2 parts; pop. variously estimated from 6,000 to 20,000. The smaller part belongs to Moldavia. The best Moldavian wine is produced in its vicinity. A congress between Russian and Turkish diplomatists was held there in 1772. The larger part belongs to Wallachia. Here the Greek Hetairists were defeated by the Turks, June 1, 1821.

FÖLDVAR DUNA, a city of Hungary, in the county of Tolna, on the right bank of the Danube; pop. about 12,000. Commanding the communication between the upper and lower Danube, it is a place of strategetical importance. The surrounding district is fertile, producing grains and wine. The chief occupation of the inhabitants is agriculture.

FOLEY, John Henry, A. R. A., an Irish sculptor, born in Dublin, May 24, 1818. At an early age he entered the drawing and modelling schools of the royal Dublin society, and in 1834 went to London and became a student at the royal academy. In 1839 he first appeared as an exhibitor there, and his models of "Innocence" and the "Death of Abel" were admired. The most popular of his imaginative works are: "Ino and the Infant Bacchus" (1840), "Lear and Cordelia" and the "Death of Lear" (1841), "Venus rescuing Æneas" (1842), "Prospero relating his Adventures to Miranda" (1843), &c. His statue of Selden was placed in the new palace of Westminster in 1855 near that of Hampden, considered his masterpiece.

FOLIGNO (anc. *Fulginia* or *Fulginium*), a walled city of the Papal States, in a beautiful valley of the Apennines, 20 m. S. E. of Perugia; pop. 15,400. It is large, but poorly built. In 1831–'2 it was nearly destroyed by earthquakes. The celebrated picture of Raphael, *La Madonna di Foligno*, took its name from this place.

FOLKESTONE, a market town, seaport, and parish of England, co. of Kent, built partly on the level shore and partly on a cliff on the straits of Dover, 7 m. S. W. of Dover, and 83 m. S. E. of London by the S. E. railway; pop. in 1851, 6,726. It was anciently a place of importance, and still has traces of Roman works of defence. In the 18th century it was the seat of extensive fisheries, and drew still greater wealth from various branches of the smuggling trade, on the suppression of which it fell into decay. Since the opening of the railway, however, which connects at this port with a line of steam packets for Boulogne, it has recovered its prosperity. The harbor has been improved, a fine pier has been built, a custom house established, new warehouses and hotels have been erected, and streets opened. It is said that the town formerly contained 5 churches, 4 of which were swept away by the sea. There are now 2, one of which was built in 1850, while the other is a cruciform structure of early date. An old castle, founded by the Saxon kings of Kent and rebuilt by the Normans, has been almost totally destroyed, together with the height on which it was erected, by the gradual encroachment of the sea. Harvey, the discoverer of the circulation of the blood, was born here. Folkestone is a sub-port of the cinque port of Dover.

FOLLEN, August, afterward Adolf Ludwig, a German poet, born in Giessen, Hesse-Cassel, Jan. 21, 1794, died in Bern, Switzerland, Dec. 26, 1855. After studying philology and theology in his native town, he served in the campaign of 1814 against France. On his return he studied law for 2 years at Heidelberg, in 1817 began to edit the *Allgemeine Zeitung* at Elberfeld, in 1819 was involved in political attempts for which he was imprisoned 2 years in Berlin, and went thence to Switzerland, where he taught the German language and literature at Aarau, and subsequently became a citizen of Zürich and member of the chief council. In 1847 he purchased the castle of Liebenfels in Thurgau, whence in 1854 he removed to Bern. He translated the Homeric hymns (in connection with K. Schwenck, Giessen, 1814), and a volume of old Latin ecclesiastical hymns (Elberfeld, 1819). His other principal productions are a romance of chivalry and magic, *Malegys und Vivian*; adaptations of *Tristan und Isolde*, and of the first part of the *Nibelungenlied*; *Freie Stimmen frischer Jugend* (Jena, 1819); *Bilder-Saal deutscher Dichtung* (Winterthur, 1827); 6 sonnets entitled *An die gottlosen Nichts-Wütheriche* (Heidelberg, 1846), directed against the critical tendencies of Ruge; and a romantic epic, *Tristans Eltern* (Giessen, 1814).

FOLLEN, Charles, an American clergyman, brother of the preceding, born at Romrod in Hesse-Darmstadt, Sept 4, 1796, perished in the conflagration of the steamer Lexington in

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Long Island sound, Jan. 13, 1840. He was educated at Giessen. In the war against France he enlisted in a corps of riflemen, but was prevented by illness from seeing much active service. After the campaign he returned to the university at Giessen, where he soon became distinguished for his liberal sentiments, and attached himself to a union, or *Burschenschaft*, which fell nnder suspicion as aiming at political revolntion, and Follen was especially obnoxious for his zeal and activity both in public and private. He wrote a defence of the *Burschenschaft*, and many patriotic songs, which, with others by his brother Angust, were published at Jena in 1819; and he was one of the authors, though it was not known at the time, of the celebrated "Great Song," which was considered seditious. In 1818 he received his degree as doctor of civil and ecclesiastical law from the university at Giessen, where he remained as a lectnrer on jurisprudence. Though at this time only 22 years of age, he was applied to by the communities of towns and villages of the province of Hesse to act as their connsellor against the government, which had passed a law establishing a commission to collect the debts of the communities incurred during the late war. A remonstrance had been made against this oppressive law, but the government declared the union seditious, and threatened to deprive any counsellor of his office who should appear on its behalf. Follen, nevertheless, readily nndertook the cause, and drew up a petition in which the rights of the communities were set forth with great skill and ability. This was immedintely presented to the grand duke, and also distributed among the people. The law was eventually repealed, but Follen's prospects for the future in his own province were utterly ruined. He then went to Jena to lecture at the university. A few months after his arrival, Kotzebue, who was an object of the hatred and the contempt of the liberal party, was assassinated by a young enthusiast named Sand. Follen was accused of being an accomplice, and twice arrested, but after a rigid examination was honorably acquitted. About the same time he was arrested on a charge of being the author of the "Great Song," but no evidence was found against him. He continued however to be an object of suspicion to government, and was forbidden to continue his lectures at Jena. He returned to Giessen, but learning that he was again to be pnt under arrest, he fled to Paris. From Paris he went to Switzerland, and was appointed professor of Latin and history in the cantonal school of the Grisons, at Chur. His lectures gave offence, for their Unitarian tendency, to some of the Calvinistic ministers of the district; and after seeking in vain for the privilege of defending the principles he had advanced before the evangelical synod of the canton, he asked a dismissal from the professorship. It was granted, but a testimony given to his ability, learning, and worth. The university at Basel then appointed him lecturer upon law and metaphysics. While at Chur and Basel a demand was made by the allied powers for his surrender as a revolutionist. It was twice refused, bnt on its renewal a third time, with a declaration that the good understanding between the governments would be destroyed if it were not complied with, Basel yielded, and a resolntion was passed for the arrest of Follen. He escaped from the city, concealed by a friend in the boot of a chaise, and soon after sailed from Havre to the United States. In Jan. 1825, he arrived at New York, and in the autumn of that year received the appointment of teacher of the German language at Harvard college. In 1828 he was appointed teacher of ecclesiastical history and ethics in the divinity school, having in the mean time been admitted as a candidate for the ministry. In 1830 he was appointed to the professorship of German literature at Harvard, which position he held for 5 years. He was afterward the pastor of a Unitarian society in New York, and in East Lexington, Mass., and was settled over the latter, when on Jan. 13, 1840, he was a passenger in the steamboat Lexington which was burnt in Long Island sound, and was one of the victims of that terrible catastrophe. While in Cambridge Dr. Follen published a German grammar and reader; he was a frequent contributor to the reviews, and occasionally gave conrses of lectnres upon various subjects. His sermons and lectures, and a sketch of a work on psychology which he never finished, with a memoir of his life by Mrs. Follen, have been published in 5 vols. (Boston, 1841). During his life in the United States he was an earnest adherent of the anti-slavery movement.—ELIZA LEE, wife of the preceding, daughter of Samnel and Sarah Cabot, born in Boston, Aug. 15, 1787, was married to Dr. Follen in 1828. In the winter of 1827–'8 she published "Selections from Fénélon," and the "Well Spent Hour." In 1829 she edited the "Christian Teacher's Manual." During the next 6 years she published several little books for children. In 1835 she wrote "The Sceptic" for the "Sunday Library." In the winter of 1838–'9 she published "Married Life," "Little Songs," and a volume of poems; and in 1841 the memoir of Dr. Follen, as the first volume of his collected works. From 1843 to 1850 she was the editor of the "Child's Friend," and in 1857 published "Twilight Stories." She has now (1859) in press a "Second Series of Little Songs," and a compilation of "Home Dramas."

FONBLANQUE, ALBANY W., an English anthor and journalist, son of John de Grenier Fonblanqne, an eminent equity lawyer, born in 1797. He studied for some time in the chambers of Chitty, the famous special pleader, with the design of being called to the English bar; but finding that literatnre, especially political literature, was more suited to his taste than the dry study of the law, he became a journalist, and as the successor of Leigh Hunt in the editorial chair of the "London Examiner," soon

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acquired distinction as one of the ablest political writers of his time. Hunt in his autobiography, alluding to his retirement from the "Examiner" in 1820, says: "I had an editorial successor, Mr. Fonblanque, who had all the wit for which I toiled, without making any pretensions to it. He was, indeed, the genuine successor, not of me, but of the Swifts and Addisons themselves; profuse of wit even beyond them, and superior in political knowledge." In the "Noctes Ambrosianæ" for Oct. 1832, Lord Jeffrey is made to say of Fonblanque: "I admit he is a very able fellow, and much regret I did not find him out a few years ago, to nail him to the 'Edinburgh Review,' where he would have been more useful than even Tom Macaulay, I suspect. He too is a gentleman, and, therefore, however he may foam away just now, I don't despair of seeing him wear round on a seat at the board of control, or the like, some pretty morning." In 1837 Fonblanque published in 3 vols. "England under Seven Administrations," a selection of his editorial articles in the "Examiner." In 1852 he was appointed director of the statistical department of the board of trade, which office he still holds, having in 1846 resigned the editorship of the "Examiner" to Mr. John Forster.

FOND DU LAC, an E. co. of Wisconsin, situated at the S. end of Lake Winnebago; area, 754 sq. m.; pop. in 1855, 24,784. It is drained by Fond du Lac river, and by the sources of Red and Milwaukee rivers. A steep ledge of limestone, running from N. E. to S. W., divides the county into two unequal portions, the easternmost of which is heavily timbered, while the other contains extensive prairies. The soil is calcareous and generally fertile. Grain, pork, and butter are the staples, and the productions in 1850 amounted to 166,718 bushels of wheat, 74,361 of Indian corn, 101,325 of oats, and 1,347,479 lbs. of butter. There were 2 newspaper offices, 17 churches, and 2,844 pupils attending public schools. The county was first settled in 1835, since which time its growth has been exceedingly rapid.—FOND DU LAC, the capital of the above county, a township and city, at the S. end of Winnebago lake, 72 m. N. N. W. from Milwaukee, and 90 m. N. E. from Madison; pop. of the township in 1855, 5,083; of the city proper, 4,280; in 1859, about 8,000. It has grown up almost wholly since 1845, although there was a trading post here at an early date. The town occupies a pleasantly wooded slope reaching toward the lake, and contains 8 churches, 2 newspaper and one job printing office, 10 steam saw mills, 2 steam flouring mills and 5 water mills in the immediate vicinity, 1 steam woollen factory, and 70 or 80 stores. It has a great number of Artesian wells, of depths varying from 80 to 100 feet. The Chicago, St. Paul, and Fond du Lac, and the Milwaukee and Fond du Lac air line railroads connect it with the principal cities and towns in the state, and steamboats ply between it and the mouth of Fox river, thus placing it in communication with the great boat channel between Lake Michigan and the Mississippi river. Since the completion of the "Fox river improvement" vessels are enabled to pass from Lake Michigan up Green bay and Fox river (which flows through Lake Winnebago) to a canal 1¼ m. long connecting that stream with the Mississippi.

FONK, PETER ANTON, a Cologne merchant, born at Goch, near Cleves, in 1781, died there, Aug. 9, 1832. He was involved in a criminal trial which created at the time much sensation in Germany. He was associated in the brandy and liquor business with an apothecary of Crefeld, who sent an agent to Cologne for the purpose of investigating the accounts of his partner. This agent, named Cönen, who seemed to have discovered considerable frauds in Fonk's transactions, suddenly and mysteriously disappeared on the night of Nov. 9, 1816. Fonk was indicted for having murdered him, assisted by his cooper, Hamacher. The latter confessed the guilt, but afterward withdrew his evidence. The trial was transferred to Treves, in order to avoid the influence which was brought to bear upon it in Cologne, where Fonk's friends held a high position. Hamacher was sentenced to 16 years' hard labor (Oct. 31, 1820), and Fonk, after having escaped conviction in several trials which took place in connection with the case, was at length found guilty of murder by 7 jurymen out of 12 (June 9, 1822), and sentenced to death. His appeal against the verdict was rejected by the supreme court of Berlin, but he was pardoned by the king (Aug. 20, 1827); and by a royal order, dated Oct. 9, he was even released from the payment of costs, which exceeded $30,000. The pardon was granted on the ground that the act of murder had not been clearly established.—The name of Peter Funk, applied to fraudulent traders in America, has been supposed to be derived from this merchant.

FONT, or FOUNT (Fr. *fonte*, from *fondre*, to melt or cast), in printing, an assortment of types of one size, in which there is a due proportion of all the requisite letters and characters. The quantity of a font is indefinite; it may consist of but a few sets of characters, as of large wood type or fancy type seldom used, or of many thousand pounds for the printing of books or newspapers.

FONTAINE, JEAN DE LA. See LA FONTAINE.

FONTAINEBLEAU, a town of France, department of Seine-et-Marne, 35 m. S. S. E. from Paris, on the S. E. railway, in the midst of the forest to which it gives its name; pop. in 1856, 8,272. It has a college, a public library, 3 handsome barracks for cavalry and infantry, a hospital founded by Anne of Austria, an asylum for girls established by Mme. de Montespan, an obelisk erected on the marriage of Louis XVI. with Marie Antoinette, and the old residence of Gabrielle d'Estrées. Its manufactures of porcelain and earthenware have some reputation; and the delicious grapes

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gathered in the vicinity, especially at Tomery, and celebrated under the name of *chasselas de Fontainebleau*, are in the season the object of a brisk and profitable trade. But the town owes its celebrity to its chateau, a magnificent pile of various kinds of architecture, which has been the residence of several monarchs, and is a favorite summer resort of Napoleon III. This chateau, originally founded by Robert the Pious toward the end of the 10th century, was rebuilt by Louis VII. in the 12th, and embellished by Philip Augustus, Louis IX., and others. Francis I. had it entirely renovated and enlarged by artists brought from Italy, Rosso, Primaticcio, Niccolo dell' Abbate, Leonardo da Vinci, Andrea del Sarto, and Benvenuto Cellini, who ornamented it with their works, important remains of which may still be seen. It was subsequently improved by Henry IV. and all his successors to Napoleon I., who spent here no less than 6,000,000 francs in 1812 and 1813. Louis Philippe in his turn put it in splendid order from 1837 to 1840, and Napoleon III. has not neglected it. Although there is little harmony among its parts, being in fact rather a collection of palaces of different epochs and styles than a single edifice, it has a striking air of grandeur and majesty, while its ornaments, pictures, and statuary are of the highest excellence. Its library is invaluable, although not very large. Its parks and gardens are worthy of the building. This chateau has been the scene of many historical events. Philip IV., Henry III., and Louis XIII. were born in it. Christina of Sweden inhabited it during her sojourn in France; and it was here, in the *galerie des cerfs*, that in 1657 her favorite Monaldeschi was put to death by Santinelli. Here an alliance with Sweden was signed in 1661, and in 1685 Louis XIV. signed the revocation of the edict of Nantes. Pope Pius VII. was confined within its walls for 18 months (1812–'13); and Napoleon, who had signed here his abdication, April 11, 1814, bade farewell on the 20th to his old guard at the principal entrance of the palace known as *la cour du cheval blanc*.—The forest of Fontainebleau (area 34,200 acres), which was originally called forest of Bière or Bièvre (*Sylva Bieria*), is as fine as any in France. Its varied and picturesque scenery is highly appreciated by travellers and landscape painters, while its quarries supply the capital with most of its paving stones.

FONTANES, Louis, marquis de, a French writer and politician, born in Niort, March 6, 1757, died in Paris, March 17, 1821. Repairing to Paris when still very young, he contributed some poetical pieces to the *Mercure de France* and the *Almanach des muses*, but his reputation began with his translation of Pope's "Essay on Man," published in 1783. This was followed by various short poems, which evinced taste, feeling, and poetical skill. On the breaking out of the revolution he joined the moderate party, and in 1793 wrote the petition which the citizens of Lyons presented to the convention against the bloody tyranny of Collot d'Herbois. This becoming known, he was obliged to conceal himself, and did not reappear in public until the 9th Thermidor. He now became one of the contributors to the *Mémorial*, a newspaper in the royalist interest. On the 18th Fructidor he took refuge in England, where he met Châteaubriand, then a penniless and unknown exile, and a lasting friendship grew up between them. Being allowed to return to France after the 18th Brumaire (Nov. 1799), he was appointed by the first consul to deliver a panegyric on Washington. He became a member of the legislative body in 1802, and was chosen its president in 1804. On the reëstablishment of the French university in 1808, Napoleon placed him at its head with the title of grand master, and employed him as his spokesman on many public occasions. In 1810 he appointed him senator and showed him many favors. Fontanes, however, who had always been a royalist at heart, deserted his protector in 1814, voted against him in the senate, and joined the new king. He thus secured the tenure of his offices and dignities, and was promoted to the peerage by Louis XVIII. During his later years he devoted his leisure hours to an epic poem, *La Grèce délivrée*, which he did not complete. The sudden death in a duel of his adopted son, M. de St. Marcellin, so preyed upon his mind that he died broken-hearted, at the age of 64. His finished style of oratory and the purity and terse elegance of his poetry have given him the title of "Racine's last descendant." A collection of his speeches was published in 1821, and his works were edited by Ste. Beuve in 1839, with a biography.

FONTARABIA. See Fuente Rabia.

FONTENAY, or Fontanet, a village of France, department of Yonne, noted for a battle which the sons of Louis le Débonnaire fought there, June 25, 841, and in which Lothaire, then emperor, was defeated with great slaughter by Louis of Bavaria and Charles the Bald. This battle was soon followed by the treaty of Verdun (843), which terminated the war of the brothers and divided the empire of Charlemagne.

FONTENAY-LE-COMTE, a town of France, formerly the capital of a department in Poitou, now that of an arrondissement in the department of Vendée; pop. in 1856, 7,315. It has several remarkable churches, a college, and 3 yearly fairs, and carries on a considerable trade in wine and timber. During the French revolution its name was changed to Fontenay-le-Peuple.

FONTENELLE, Bernard le Bovier or le Bovyer de, a French writer, born in Rouen, Feb. 11, 1657, died in Paris, Jan. 9, 1757. He was the nephew of Corneille by his mother, Marthe Corneille, who had married a lawyer of Rouen, and according to his father's desire he studied the law, but not succeeding in his first suit he devoted himself to literature. His first performances were light poems, pastorals, and plays; his tragedy of *Aspar*, which appeared in 1680, was hissed by the public and ridiculed by

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Racine and Boileau. In 1683 he published the *Dialogues des morts*, which was the beginning of his reputation. In 1686 his *Entretiens sur la pluralité des mondes*, and in 1687 his *Histoire des oracles*, an abridgment of a voluminous book of Van Dale in Dutch, rendered him popular among those who were fond of scientific matters expounded in an elegant and somewhat affected style. His *Histoire de l'académie des sciences* and *Éloges des académiciens* are still admired for their clearness, perspicuity, and elegance. D'Alembert wrote a eulogy, and Villemain has a vivid sketch of him in his *Tableau de la littérature au 18e siècle*.

FONTENOY, a village of Belgium, province of Hainault, 5 m. S. E. from Tournay, noted for a victory of the French over the English, Dutch, and Austrians, May 11, 1745, fought by the latter for the relief of Tournay, then besieged by the French. The French, 76,000 strong, led by Marshal Saxe and animated by the presence of the king and the dauphin, were posted on a hill with Fontenoy before them, the village of St. Antoine and the river Scheldt on the right, and a small wood on the left. Their naturally strong position was so fortified by art as to be deemed almost impregnable. The allies, numbering 50,000, more than half of whom were English, were under the duke of Cumberland. They attacked the French outposts on the 10th, passed the whole night under arms, and early the next morning began the engagement by a fierce cannonade. The Dutch undertook to carry St. Antoine and Fontenoy by assault, but were driven back in disorder. Gen. Ingoldsby, who had been ordered to pierce the wood with a British division, retired with dishonor, while the duke of Cumberland, with 14,000 British and Hanoverian infantry marching in columns of 30 or 40 front, led the assault upon the main body. With bayonets fixed they plunged down a ravine which separated them from the French line, and while artillery mowed down their ranks from right and left, marched steadily forward with rapidly diminishing numbers but unflinching courage. They gained the hill in a solid mass, cut down every thing before them, and had nearly won the day by intercepting the French retreat to the Scheldt, when Saxe, having in vain urged the king to fly, collected his force for a last effort. By the advice of the duke of Richelieu, 4 pieces of cannon were brought to bear upon the British front, while the household troops, the reserve, and foremost of all the brigade of Irish exiles, charged on either flank. Exhausted and unsupported, the English fell back, but their retreat was as firm as their advance. Their cavalry now came to the rescue, and they reached the allied position with unbroken ranks, having twice cut through more than 5 times their number of the enemy. The allies retreated to Ath, leaving 7,400 killed, wounded, and prisoners, while the French acknowledged about an equal loss. The young duke de Grammont was one of those who fell. Tournay surrendered June 21.

FONTÉVRAULT, Order of, a monastic order in the Roman Catholic church, founded in 1096 at La Roc, in the forest of Craon, by Robert of Arbrissel, who called his followers *Pauperes Christi* (the poor of Christ). They were transplanted in 1099 to the desert of Fontévrault. As the rule of St. Benedict was adopted, the order may be considered as one of the numerous branches of the Benedictines. The founder established at Fontévrault 4 buildings, one for 300 nuns, one for 120 sick, one for penitent females, and one for monks, with one church for them all in common. The most remarkable feature in this order is its constitution. In honor of the Holy Virgin and the authority which Jesus gave to her over John when he said to the latter, "Behold thy mother," the government of the whole order was conferred upon the nuns with an abbess at their head. The monks rendered the service of obedient sons. The founder placed himself under the authority of the first abbess. The order was ratified by the pope in 1106, and exempted from the jurisdiction of bishops. It soon spread over France, Spain, and England, and counted at the death of the founder 3,000 nuns. The relation of the sexes to each other led to many disorders, the monks making repeated attempts to emancipate themselves. When, in 1459, the abbess Marie de Bretagne saw herself unable, even with the assistance of the pope, to overcome the opposition, she retired with some sisters to Orleans and there restored the old discipline. This reformed branch was confirmed in 1475, and soon counted 28 convents, while the rest of the order was divided into several congregations. The continued differences existing in the order induced the king of France in 1520 to decree that the abbess should be elected for life, but that the visitation of all the convents should be transferred to a member of another order, to be designated by the pope. The reformation put an end to the convents in England, and the French revolution to the rest of the order. The last abbess died at Paris in 1799. The extensive abbey buildings of Fontévrault are now used as a *maison de détention* by the French government. The church is famous for possessing the monumental effigies of two English kings, Henry II. and Richard Cœur de Lion, and of Eleanor of Guienne, queen of the former, and Elizabeth, consort of John Lackland, who were buried here.

FOO-CHOW, Foo-choo, or Foo-chow-foo, Fu-chu, or Fu-chu-fu ("happy city"), a populous city of China, capital of the province of Fokien, and one of the 5 ports thrown open to the British by treaty in 1842; pop. about 600,000. It stands on a plain on the left bank of the Min, 25 m. from its mouth, surrounded by an amphitheatre of hills about 4 m. distant, and defended by a wall the circuit of which cannot be less than 10 miles. This wall is 30 feet high, 12 feet thick, and overgrown with grass. It has towers at short intervals in which a few pieces of cannon are placed and guards constantly stationed.

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The entrance to the city is by 7 gates, each commanded by lofty towers, and the defences are still further strengthened by fortifications on 2 hills, one within the city, and the other rising from the plain outside the walls. The suburbs, which are equal in extent to the city itself, stretch along both banks of the river, and communicate with each other by means of a stone bridge 420 paces long, resting on a small island in the stream, supported also by 49 stout piers, and lined with shops. One small suburb near the Tang-mun, or Bath gate, contains a number of public hot baths. The city proper is regularly built, with low tile-roofed houses, vast granaries, and some handsome buildings, among which are the residences of the civil and military officers of the province. The temples are numerous, the largest being that known as the Ching-hwang-miau; the most popular deities are the god of war and the goddess of mercy. The shops, of which there are very many, are stocked with a profusion of goods of rather poor quality. They are quite open, and with the full display of their contents, the jostling and noise of the hucksters, and the crowded state of the streets, give the thoroughfares much the appearance of a market place. One of the most singular features of Foo-chow is the great number of watch towers erected in all parts of the city—on the walls, over the streets, and even on the house-tops—some of them covered with grotesque ornaments, and one in particular attracting the notice of strangers by its great height and its clock dial with Roman letters. The streets are planted with trees, and regularly laid out, but there is little else to be said in their praise; the most abominable filth accumulates in them without seeming to cause the inhabitants the slightest inconvenience, beside which they are infested with beggars, whose squalid and loathsome appearance is beyond description. Fully one-half the population is said to be addicted to opium-smoking, the annual expenditure for which amounts to $2,000,000. In the city and vicinity there are 500 furnaces for making porcelain, in addition to factories of blue cloth, cotton goods, screens, combs, &c. There are lead mines near by, and a great tea-growing district lies within 70 miles, so that black tea can be purchased here 25 per cent. cheaper than at Canton. The commerce of the city is chiefly with Japan, the Loo-choo islands, and the maritime provinces of China. Timber, tea, paper, bamboo, fruits, spices, corn, copper, and lead are the principal exports; the imports are salt, European manufactures, sugar, and a great variety of other goods. The approach to the harbor from the sea is difficult, but there is good anchorage at Pagoda island, 9 miles below the city. The port is much frequented, the channel of the river and a sheet of water called Li-hu, or West lake, on the W. side of the city, being crowded with fishing and trading vessels, ferry boats, and floating habitations. The merchant shipping is estimated at 29,000 tons, and the value of import and return cargoes is supposed to amount to $7,000,000 per annum, in addition to which an extensive trade is carried on by land.—There is another city in China of the same name, 240 m. N. W. of this, in the province of Kiang-si.

FOOD. See Aliment, and Dietetics.

FOO-SHAN, or Fu-shan, a large city on the island of See-kiang, province of Quang-tung, China. It is said to contain upward of 200,000 inhabitants, many of whom live in boats.

FOOL, or Jester, a character in mediæval courts and noble families, whose business it was to entertain the household by amusing sallies. Somewhat similar were the parasites of antiquity, who were wont to pay for their dinners by jests and flatteries. Court fools do not appear distinctly and officially till after the crusades, and may have been introduced into Europe from the East. They were at first either misshapen, half imbecile dwarfs, who were themselves ridiculous objects, and whose senseless replies were welcomed with laughter; or quick-witted, half-mad fellows, such as are not unfrequently found among the deformed; or poor and merry poets, who devoted themselves to this part for the income which it obtained. Among the insignia of the office were the fool's cap, party-colored, adorned with 3 asses' ears and a cock's comb, and worn on a shorn head; the variously shaped fool's sceptre or bauble; the bells, which decorated the cap and most other parts of the costume; and a wide collar. One of the most celebrated of fools was Triboulet, a favorite of Francis I. of France, who amused his master often by giving him most impertinent counsels. He carried tablets with him on which he inscribed the names of those courtiers who had committed any act of folly. His successor was Brusquet, who combined other offices with that of fool, who suffered much from the tricks of the courtiers whom he mystified, and whose bon-mots have been often repeated. Earlier French fools of renown were Caillette, Thony, Sibilot, Chicot, and the female Mathurine, and the annals of the office in France terminate with Angely, who was the titular fool of Louis XIII., and who became by his refined and cynical pleasantry one of the most formidable personages at court. Jodel der Narr, who was taken by the emperor Ferdinand II. to the diet in 1622, and Klaus Narr of Saxony, are famous among German fools. The office ceased in most European countries about the close of the 17th century, but continued longer in Russia, where Peter the Great often had 12 fools, and the empress Anne 6, among whom were the Portuguese Da Costa and the Italian Pedrillo. In England the fools were long distinguished by a calf-skin coat, which had the buttons down the back, and which protected them from the anger of those whom they provoked by their jests. By the illuminators of the 13th century they are represented as squalid idiots, wrapped in a blanket, and holding a stick with an inflated bladder attached to it, which served as a bauble. It was not till the 16th century that they were often men of ability, when,

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as appears from Shakespeare and other dramatists, the entertainment that they afforded consisted in witty retorts and sarcastic reflections. Though their license was very extensive, they were liable to correction or discharge from office. Thus Archibald Armstrong (called Archy), jester to Charles I., was ordered for "certain scandalous words, of a high nature, spoken by him against the lord archbishop of Canterbury, to have his coat pulled over his head, and be discharged the king's service, and banished the court."

FOOLAHS, Fulbe (sing. Pullo), Fellani, or Fellatah, a people of W. and central Africa, comprising many tribes scattered over the region which lies between Bondoo and Senegambia, and the great desert and Guinea. Originally they were a nomadic race, whose chief occupation was cattle-breeding, but about the middle of the 18th century, most of them becoming converts to Islamism, they began to found independent states, and to prosecute a course of conquest which they are still pursuing. About 1802 one of their chiefs, called Othman or Danfodio, began to emulate the career of Mohammed, and, aided by a religious enthusiasm which he excited among his followers, laid the foundation of an empire at Sackatoo, between Bornou and the river Niger. He died in a sort of fanatical ecstasy in 1818. According to Dr. Barth, the revenue of the provinces subject to his successors is about $50,000 in shell money, and as much more in slaves and goods, which is less than it was at a more flourishing period of the empire. The military force consists of about 25,000 cavalry, but on account of the rebellious spirit of some of the provinces, all these troops could not be concentrated in the field. Gando, 30 or 40 miles from Sackatoo, is the seat of a Foolah prince of equal power with the above; and at Timbo, the capital of Foota Jallon, resides a third. It is the opinion of modern travellers that the Foolahs are destined to become the dominant people of Negroland, and they have excited more interest and scientific research than almost any other African race. In language, appearance, and history, they present striking differences from the neighboring tribes, to whom they are superior in intelligence, but inferior, according to Barth, in physical development. Mr. Golbéry described them as robust and courageous, of a reddish black color, with regular features, hair longer and less woolly than that of the common negroes, and high mental capacity. Lander, who saw them near Borgoo, was struck by their resemblance to the Caffres, and says that they differ little in feature or color from the negroes; other travellers speak of them as having tawny complexions and soft hair. Dr. Barth found great local differences in their physical characteristics, and Bowen describes the Foolahs of Yoruba as being some black, some almost white, and many of a mulatto color varying from dark to very bright. Their features and skulls were cast in the European mould. They have a tradition that their ancestors were whites, and certain tribes call themselves white men. Some of them relate that they came from the country around Timbuctoo, and the prevailing opinion has been that their course of conquest was from central or E. Africa westward; but Dr. Barth, while supposing the cradle of the race to have been E. of the territory which they now occupy, agrees with Clapperton in thinking that they made a second migration from the Senegal toward their birthplace, in the course of which they absorbed or conquered the tribes which lay in their march. The notion has been entertained that they are descendants and derived their name from Phut, grandson of Noah; and Bowen identifies them with the ancient Psylli or Ψυλλοι, who once attempted to migrate across the desert from the south. M. d'Eichthal, judging from certain linguistic analogies, maintains that the Foolahs are an offset of the Malays, but this opinion has been vigorously opposed, and appears to rest on insufficient foundation. Prichard considers them a genuine African race, probably differing less than is commonly supposed from the black Soodanian nations. Their language is peculiar, being neither African nor Semitic. Many of the tribes which have become consolidated with them have so far lost their nationality as to be looked upon as aboriginal Foolahs, and in some cases form the aristocracy, while others have become degraded. Foolahs are found in the suburbs of most of the towns of Soodan, pursuing the avocation of dairymen and cattle breeders. Most of them are Mohammedans. The usual dress of the men is a red cap with a white turban, a short white shirt, a large white robe, white trousers trimmed with red or green silk, and a pair of sandals or boots. The women wear a striped garment falling as low as the ankles, are fond of ear rings, bracelets, and trinkets, and take great pains in dressing the hair. The children of both sexes of the better classes are taught to read and write Arabic, in which language the Mohammedan Foolahs say their prayers. The men wear swords at all times, and even go armed with bows and arrows on horseback. The sovereign of each Foolah state appoints governors of the provinces at pleasure, and on their death succeeds to all their effects. The Foolahs are in continual hostility with the Arabs, and in general have something of a republican spirit, with all the air and manner of free-born men.—See, beside the narratives of the travellers above mentioned, and the ethnological works of Prichard and Latham, *Histoire et origine des Poulhas ou Fellans*, by Gustave d'Eichthal (8vo., Paris, 1842).

FOOLS, Feast of, a mediæval grotesque religious ceremony, celebrated for several centuries, chiefly in France, at the festivals of the Nativity, the Circumcision, the Epiphany, the Murder of the Innocents, and especially at Christmas and Easter. The customs and amusements usually connected with the pagan Saturnalia had continued in spite of prohibitions to be observed among Christians both in the East

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and West, and gradually attached themselves to the Christian festivals occurring in December and January, which had been the months of the pagan celebrations. Though encouraged and participated in by the clergy, the *festum fatuorum* or *follorum* was a mixture of farce and piety, and a sportive travesty of the offices and rites of the church. The priests and clerks elected a pope, archbishop, or bishop, and conducted him in great pomp to the church, which they entered dancing, masked, disguised as women, animals, and merry-andrews; they sung infamous songs, converted the altar into a buffet, where they ate and drank during the celebration of the holy mysteries, played with cards and dice, burned old sandals instead of incense, ran about leaping, and amused the populace by indecent sallies and postures. The feast of fools was prohibited by the papal legate Peter of Capua in the diocese of Paris in 1198, but was celebrated until its condemnation by the Sorbonne in 1444, and did not entirely disappear till toward the end of the 16th century. It was known in Germany only in the cities on the Rhine. It hardly equalled the feast of asses in fantastic disorder, but was more uncouth than the festival of the boy-bishop which was observed in England on St. Nicholas's day.

FOOSEE, Fousi, or Fusi, a volcano of Japan, commonly called by the natives Fooseeyama. It stands in an isolated position on the island of Niphon, and is the loftiest mountain in the empire, its height, according to Siebold, being 12,440 feet. It is covered with perpetual snow. It was formerly the most active volcano in Japan, but no eruption has taken place since 1707. Native historians assert that in the year 283 B. C. an extraordinary natural revolution produced in a single night both the mountain of Foosee and the basin of the great lake Oits Mitsoo; the elevation of surface caused by the former, as it rose from the bosom of the earth, being exactly counterbalanced by the depression which constitutes the latter. The Japanese hold this mountain in religious veneration. Some of its ravines are consecrated to the worship of Buddha, and every August crowds of devotees make pilgrimages to the idols in these spots.

FOOT, a measure of length indicating its origin by its name, in general use in all civilized countries, and supposed to be adopted from the length of the human foot, possibly at first of some reigning sovereign. The length is very variable within moderate limits in different countries. The Roman *pes* has been calculated from several sources, as ancient measures, measurements of recorded distances along roads, and measurements of buildings of recorded dimensions. From the first source their foot appears to have been .9718 of the English foot, from the 2d .97082, and from the 3d .96994; the average of which would be 11.6496 inches. The Greek *πους* as used at Athens is believed to have been to the Roman foot as 25 is to 24, making it 12.135 English inches. The English standard is now referred to the length of a pendulum beating seconds, in London. The foot is 12 inches, and the seconds pendulum in that latitude is 39.13842 inches. The United States standard is a brass rule made for the coast survey by Troughton of London, from the English standard. The following are a few of the principal feet, with their value in decimals of the English foot: the French old *pied du roy* equals 1.07, the modern *pied usuel*, 1.093; Amsterdam old foot, 0.93—since 1820, if used, 1.093; Denmark Rhineland foot, 1.04; Hamburg, .941; Stockholm, .97; St. Petersburg, 1.145; Riga, .89; Canton, 1.05; Lisbon, .927, or according to others, .72; Turkey, 1.16; Constantinople, 1.23. As used by surveyors and engineers, the foot is decimally divided. Architects and artificers employ it with these divisions, and their scales are also made with inch divisions, and these subdivided into eighths and sixteenths of an inch.

FOOT, Solomon, an American statesman, born in Cornwall, Addison co., Vt., Nov. 19, 1802. He was graduated at Middlebury college in 1826, was principal of Castleton seminary in 1826 and 1828, and in 1827 was tutor in the university of Vermont. From 1828 to 1831 he was professor of natural philosophy in the Vermont academy of medicine at Castleton. In 1831 he was admitted to the bar, and settled in Rutland, where he has resided ever since. In 1836, '7, and '8, and in 1847, he represented the town of Rutland in the Vermont legislature, and in the last 3 years of his service was speaker of the house. In 1835 he was a delegate from Rutland to the constitutional convention, and made an elaborate speech in favor of creating a senate as a coördinate branch of the legislature. The measure was adopted by a close vote after an able and protracted debate. In 1842 and again in 1844 he was elected a representative in congress. In 1846 he declined a reëlection, and resumed the practice of his profession. In 1850 and again in 1856 he was elected to the U. S. senate. He has made many elaborate speeches in the senate, and bore a conspicuous part in the great Lecompton debate of 1858. In 1854–'5 Mr. Foot was chosen president of the Brunswick and Florida railroad company in Georgia, and during the recess of congress visited England, negotiated the bonds of the company, and purchased the iron for the railroad, after which he resigned his post as president.

FOOTA, a territory of Senegambia, W. Africa, extending from Dagana on the N. W. to North Guerer on the S. E., between lat. 15° and 16° 26′ N., long. 12° 36′ and 16° 36′ W. It is a fertile, well watered country, producing rice, cotton, tobacco, and various kinds of grain. Large forests are spread over the surface, pasture lands support sheep and cattle, and there are several mines of iron. The inhabitants are mostly negroes, active and industrious, but, like most of their race, extravagantly superstitious. They profess Mohammedanism, and are firm believers in witchcraft. They cultivate the ground with considerable skill, and are active

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fishermen. Their manufactures are confined to cotton cloth and earthenware. The country is divided into 3 parts or provinces, viz.: Foota Tora on the N., Foota proper in the middle, and Foota Damga on the E. Each of these has its chief, subject to the *almamy* or sovereign of the whole territory. The latter is chosen from a few privileged families by a council of 5. His authority is both secular and sacerdotal, but the council has the right of reprimanding, deposing, or in some cases putting him to death.

FOOTA JALLON, or FUTAJALLON, a large territory of Senegambia, W. Africa, situated about the sources of the Gambia, Rio Grande or Jeba, and Niger or Joliba, and intersected by lat. 13° N. and long. 13° W. It is mountainous and rocky, but about ⅓ of it is extremely fertile, producing rice, maize, oranges, bananas, dates, wine, and oil, while large flocks of sheep pasture on the highlands. Iron ore is wrought and manufactured into a very malleable species of metal. The inhabitants are Mohammedans of the Foolah race, remarkable for their fanatical hatred of all infidels except the whites, from whom they claim descent. Their houses are neat and well built; the principal towns contain manufactories of articles of dress, of iron, silver, wood, and leather. Trade is carried on with Timbuctoo, Cassina, and other places, and the merchants frequently make long commercial journeys. Timbo, the capital, contains 7,000 inhabitants, and there are several other towns with a population of between 3,000 and 5,000. The government is elective.

FOOTE, HENRY STUART, an American statesman, born in Fanquier co., Va., Sept. 20, 1800. He was graduated at Washington college, Lexington, Va., in 1819. After leaving college he studied law, and obtained license to practise in 1822. In 1824 he removed to Alabama and settled at Tuscumbia. He resided there two years, practising law and editing a democratic newspaper. In 1826 he removed to Mississippi and established himself at Jackson. In 1847 he was elected to the U. S. senate, took his seat in December of that year, and was placed at the head of the committee on foreign relations. In 1850 he took an active part in favor of the "compromise measures." In 1851 he became the candidate of the union party for governor of Mississippi, and after a very exciting canvass he was elected by about 1,000 majority over his competitor, Jefferson Davis. He resigned his seat in the senate and entered upon his duties as governor in Jan. 1852. In 1854 he removed to California, and in 1856 supported Mr. Fillmore for the presidency. In the spring of 1858 he returned to Mississippi and settled at Vicksburg. In May, 1859, he attended the southern convention at Knoxville, Tenn., and made speeches against disunion which attracted much attention throughout the country. Mr. Foote has been engaged in three "affairs of honor." In his first duel, with Mr. Winston of Tuscumbia, Ala., he was slightly wounded in the left shoulder. He afterward fought in Mississippi with S. S. Prentiss, and was again slightly injured; and still later he exchanged shots with J. F. H. Claiborne, when neither party was hurt.

FOOTE, SAMUEL, an English dramatist and actor, born in Truro, Cornwall, in 1720, died in Dover, Oct. 21, 1777. His father was a magistrate and a member of parliament, and his mother was a sister of Sir John Dyneley Goodere, whose murder by his brother, Capt. Goodere, caused a profound sensation in the early part of the 18th century. Foote was entered at Worcester college, Oxford, but his powers of mimicry involved him in indiscretions which led to the severance of his connection with the university when he was 20 years of age. He soon afterward became a student at law in the Temple, and, plunging into a career of pleasure, in less than 4 years dissipated, at the gaming table and by reckless extravagance of all kinds, two fortunes which he had successively inherited from his uncle and his father. Obliged to live by his wits, he determined to become an actor, and in 1744 made his début at the Haymarket theatre in the character of Othello. He attracted little attention in tragedy or in comedy, which he subsequently attempted, and it was not until he brought the political and social notabilities of the day upon the stage by his wonderful gift of mimicry that he discovered the true road to success. In the spring of 1747 he opened the Haymarket theatre with a piece called "The Diversions of the Morning," written by himself, and in which he was the principal actor. The reputation he had already acquired for brilliant and ready humor drew a crowded house, and the piece was successful almost beyond precedent. The licensing act having been applied against him by those whose foibles he had thus publicly portrayed, he made his piece a morning entertainment, and under the title of "Mr. Foote taking Tea with his Friends," it was repeated for 50 successive mornings. A similar piece, entitled "The Auction of Pictures," proved equally successful, and the author was complimented with the title of the English Aristophanes. He kept the Haymarket theatre open without a license for 10 years (during which he found time to dissipate a 3d fortune), furnishing a constant supply of new plays to replace the old ones, and became the admiration and the terror also of the town, as no person whose character possessed any vulnerable points was safe from his mimicry. In 1767 a fall from his horse occasioned the amputation of one of his legs; and the duke of York, who witnessed the accident, procured him a regular patent to open a theatre. He still wrote and acted, but less frequently than before, and in 1777, with a constitution undermined by ill health and mental suffering, he undertook a journey to France, and died on the way at Dover. By a sort of poetical justice his unsparing ridicule of prominent personages at last recoiled upon his own head, and his death was undoubtedly hastened by the monstrous charges, subsequently disproved, which the notorious

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duchess of Kingston, whom he had threatened to satirize, caused to be preferred against him. As a humorist Foote has had few equals in any age or country, but cannot justly be compared to Aristophanes, as he possessed neither the imagination nor the poetic genius of the Athenian satirist. His wit was as ready and universal as it was unsparing. He was not merely a great mimic, but he combined with his mimicry a comic genius and invention peculiar to himself. Withal, notwithstanding the dislike with which many regarded him, he was probably not wilfully satirical or unfeeling, but was mastered by his strong propensity to mimicry. His plays, consisting principally of light comedies and farces, are seldom performed now, for the reason that they refer to contemporaneous characters whose peculiarities have long been forgotten. They are often hastily and carelessly constructed, but the flow of dialogue is so easy and natural, and the movement so full of life, that one is led to regret that they dealt with subjects so transitory. The traditions of Foote's conversational powers and ready wit are imperfectly sustained by the specimens which his biographers have preserved. His humor was so irresistible that even his enemies were obliged to succumb to it. Dr. Johnson, who disliked Foote, relates that having met him at a dinner party, he made up his mind not to be pleased, but was finally obliged to "laugh it out with the rest." He was open-handed in his charities, and notwithstanding the unpardonable use of his satirical powers, possessed many warm friends. Of his plays, each of which had some peculiar object of satire, those which have kept the stage longest are the "Minor," in which the Methodists are satirized, the "Englishman returned from Paris," the "Bankrupt," which attacks the newspapers, the "Orators," the "Lame Lover," the "Liar," and the "Mayor of Garratt." His dramatic works have frequently been published, though never in a complete edition. William Cooke published his memoirs in 1805. An essay on his life and genius by John Forster was published in the "Quarterly Review," No. CXC.

FORBES, Duncan, a Scottish statesman, born near Inverness, Nov. 10, 1685, died Dec. 10, 1747. Though living within the highland line, the Forbes family were of lowland origin, and were Presbyterians, and strongly attached to the principles of the revolution of 1688. After being educated at Inverness and Edinburgh, young Forbes, in conformity with the then prevailing custom of Scotland, was sent to the continent to study the Roman law, and entered the university of Leyden. In 1708, soon after his return to Scotland, he married Mary Rose, daughter of the laird of Kilravock, who had an estate near Culloden, and in 1709 Forbes became a member of the faculty of advocates. At an early period he won the friendship of the famous John, duke of Argyle; and in 1715 he took an active part in suppressing that rebellion of which Mar was the head, and which Argyle crushed at Sheriffmuir. He was appointed to aid in prosecuting the captured rebels, but it does not appear that he acted in the office, and he was prominent in aiding the Scotch prisoners in England. In 1716 he was appointed advocate depute, or inferior prosecutor for the crown, in 1722 was returned to the British house of commons for the Inverness district of burghs, and in 1725 became lord advocate. The office of secretary of state for Scotland being at this time discontinued, its duties devolved on the lord advocate, who was thus temporarily at the head of the government. The same year the malt tax was first introduced into Scotland, giving rise to a serious riot at Glasgow, fomented by the local magistrates, in which 9 persons were killed. Forbes repressed the disorders with a high hand, causing the magistrates to be imprisoned for a time in their own gaol. The office of lord president of the court of session was conferred on him in 1737. He still paid regard to political affairs, and formed a plan which Lord Chatham afterward adopted, and which has been considered one of that eminent man's chief claims to renown. He proposed that government should raise several regiments of highlanders, to be employed in the threatened Spanish war. Every officer under the grade of colonel was to be named from a list that he had formed, which comprehended all the chiefs and leaders of the disaffected clans, who were the very persons whom France and Spain would call upon, in case of a war, to aid the pretender. Several leading men, including Walpole, approved the plan, but nothing was done. When the second rebellion broke out, in 1745, he exerted himself strenuously to prevent the spread of it, withheld several highland chiefs from joining the pretender, and was more efficient than any other man in restraining the rebels till the government was prepared to take the field. He succeeded partly in keeping Lord Lovat quiet, and had him arrested. After the battle of Culloden, which took its name from Forbes's family estate, he sought to moderate the ferocity of the victors, but his remonstrances were treated with "the utmost scorn and contempt." He was insulted by Cumberland, who called him "that old woman who talked to me about humanity." The government used him with baseness. He had advanced large sums of money in aid of it, and had borrowed from others; and it is believed that none of his advances were returned, and that the money he borrowed, both principal and interest, was repaid from his estate, after his death, by his son. Forbes saw the changes that were forced upon Scotland after the rebellion with regret, and his death, which happened 20 months after the battle of Culloden, is supposed to have been caused by "heartbreak," the consequence of the humiliation of himself and his country. He was an author in a small way, and being himself a Hebrew scholar, wrote in illustration of the works of John Hutchinson, and other religious books. Few names stand so high in Scotland as that of Duncan Forbes. His biography has been written by Mr. John Hill

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Burton, an eminent Scottish historian and lawyer.

FORBES, Edward, an English naturalist, born in Douglas, in the isle of Man, in 1815, died at Wardie, near Edinburgh, Nov. 18, 1854. From early childhood he manifested a strong taste for the study of natural history, and at the age of 7 had collected a small museum, the contents of which he named according to the system of Linnæus. At 12 years of age he had read the geological works of Buckland, Parkinson, and Conybeare; and about the same time he compiled a "Manual of British Natural History," which, although never published, was made the repository of scientific notes during his whole life, and was frequently consulted by him with advantage. In his 17th year he went to London with some idea of becoming a painter, and in the studio of Mr. Sass acquired a facility in drawing which afterward proved of great assistance in his scientific explorations. But finding that the pursuit of this art would not give scope to his love for the natural sciences, he repaired in 1831 to Edinburgh, where he studied medicine, and was for several years under the instruction of Professors Jameson and Graham in his favorite branches. At this period, and indeed throughout his whole life, he was not less remarkable for his success in inspiring his fellow students with a taste for natural history, than for the energy with which he organized and conducted excursions on land and water in search of new objects to add to his large collections, or to illustrate his own studies. Dredging in the waters for specimens of submarine zoology, which at the commencement of his studies was a comparatively new occupation to naturalists, became under his hands the means of opening a new field of research, if not a new branch of science; and the results of his labors, published in the 8th and 9th vols. of the "Magazine of Natural History," under the title of "Records of the Results of Dredging," were among his earliest contributions to scientific literature. In his 18th year he made a summer excursion with a fellow student to Norway, bringing back abundant specimens of its rocks, plants, and mollusca, which formed the basis of an article in the "Magazine of Natural History," under the title of "Notes of a Natural History Tour in Norway." He remained connected with the university of Edinburgh until 1839, varying his residence there by excursions to southern Europe, the Mediterranean, and Algeria. The greater part of 1837 he passed in Paris studying geology, mineralogy, and zoology, under Prevost, Geoffroy St. Hilaire, and others, and working in the museum and collections of the *jardin des plantes*. During this period he published also papers on the "Mollusca of the Isle of Man," the "Land and Fresh Water Mollusca of Algiers," and on the "Distribution of the Pulmonifera of Europe," beside several on miscellaneous subjects in zoology and botany. Although nominally a student of medicine at Edinburgh, he never took the degree of M.D., having determined before the close of his academic career to devote himself to the study of botany and zoology, particularly of the submarine kingdom, and of the natural sciences generally. In 1841 he published his "History of British Starfishes," a work not less remarkable for the many new species which it mentioned, than for its genial style and the illustrations and tail pieces, 120 in number, designed by himself. The grace and humor which distinguished the latter showed that the author might have attained eminence as an artist, had he chosen to confine himself to that profession. In the spring of 1841 he embarked in the capacity of naturalist on the surveying ship Beacon, destined for the coast of Asia Minor, where, among other duties, she was to receive the Xanthian marbles, the existence of which had then recently been made known by the explorations of Sir Charles Fellows. During the 18 months that Mr. Forbes remained on board the vessel he established by innumerable dredging operations in various depths of water the important law that the distribution of marine life, like that of terrestrial animals and vegetables, is determined by certain fixed laws, and that the zones which the different species inhabit are as distinctly marked in the one case by the climate and the depth and composition of the water, as in the other by temperature, altitude, and other influences. The results of these researches were given in a paper entitled "Report on the Mollusca and Radiata of the Ægæan Sea, and on their Distribution, considered as bearing on Geology," which was read before the meeting of the British association in Cork in 1843. He also assisted in the excavations of the Xanthian cities, the ruins of 20 of which he was instrumental in discovering. In 1846 he published, in conjunction with Lieut. Spratt, "Travels in Lycia, Milyas, and the Cibyratis," the numerous illustrations in which were from his pencil. In the latter part of 1842 he was contemplating a dredging expedition to the Red sea, when he was recalled to England by his appointment as professor of botany in King's college, London. He delivered his inaugural address in May, 1843, and about the same time was appointed curator of the museum of the geological society, and palæontologist of the new museum of practical geology, established in connection with the ordnance geological survey. He subsequently became professor of natural history at this institution. Among the first fruits of his labors in this congenial sphere was an important treatise, "On the Connection between the Distribution of the Existing Fauna and Flora of the British Isles, and the Geological Changes which have affected their Area" (1846), in which the conclusions arrived at, after investigations in an unusually wide field of speculative research, are that the fauna and flora of Britain, both terrestrial and marine, are members of families inhabiting a contiguous continent, which at no very remote period existed in the Atlantic, whence they migrated before, during, or after the glacial

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epoch. The absorbing nature of Prof. Forbes's duties, which included the classification and arrangement of the fossils collected by the ordnance surveyors, did not prevent him from continually adding to the mass of original matter which had accumulated during his dredging excursions, or from appearing frequently before the scientific bodies of the country as the author of papers on marine zoology, geology, and many kindred subjects. Of papers on zoology and geology he prepared previous to 1850 upward of 89, exclusive of his botanical papers or those published since that date, which are numerous; and his note books and collections contained the materials for many more. One of the most important works in which he took part after his connection with the geological society was the preparation of the palæontological and geological map of the British isles, to which he appended an explanatory dissertation and a map of the "Distribution of Marine Life." In 1852 he was elected president of the geological society, and in the succeeding year obtained the professorship of natural history in the university of Edinburgh, vacated by the retirement of Prof. Jameson, a position which it had been the ambition of his life to fill. He delivered a course of lectures in Edinburgh in the summer of 1854, but was soon after attacked by a disease of the kidneys, which ultimately proved fatal. He died in the plenitude of his reputation and intellectual powers, having written more on scientific subjects in the last 4 years of his life than in any corresponding period, and having exerted an influence upon the pursuit of natural sciences which few men of maturer age have equalled. In addition to the works enumerated, Prof. Forbes assisted Mr. Hanley in the preparation of the "History of British Mollusca" (4 vols. 8vo., 1853), the descriptions in which were written by himself, and contributed important information respecting the distribution of plants and animals to the last edition of Johnston's "Physical Atlas." He also possessed a considerable knowledge of general literature, which in the intervals of his scientific labors he assiduously cultivated; and after his death his friends were surprised to learn that for a number of years he had been a regular contributor of miscellaneous articles to the columns of the London "Athenæum" and "Literary Gazette," a collection of which was published under the title of "Literary Papers by the late Edward Forbes, with a Memoir by Huxley" (12mo., 1855). His other posthumous publications are: "Zoology of the Voyage of H. M. Ship Herald" (3 vols. 4to.), and "Mollusca and Radiata of the Voyage of H. M. Ship Herald," the latter written in conjunction with Prof. Huxley. Although in the universality and grasp of his knowledge and in the variety of his accomplishments he showed himself preëminent, it has been truly said of him that he made no memorable discovery, initiated no critical movement, and never showed himself inventive like Linnæus, or Cuvier, or even Buffon. In the language of his friend Dr. Samuel Brown: "His true greatness was cumulative; and if he had lived as long he might have rivalled Humboldt. As it is, he was not a philosopher nor a great discoverer; but he was a consummate and philosophical naturalist, wider than any man alive in his kind."

FORBES, James, an English civilian and writer, born in London in 1749, died Aug. 1, 1819. In 1765 he went to India and entered the company's service. In 1780 he was appointed collector and chief resident of Dhuboy, in Guzerat. On the cession of Guzerat to the Mahrattas in 1783 he returned to England. His most important literary work is his "Oriental Memoirs" (4 vols. 4to., London, 1813).

FORBES, James David, a Scottish naturalist, born April 20, 1809. From an early period of his career his attention has been largely given to researches on heat, and experiments in electricity and terrestrial magnetism, the results of which have appeared in many numbers of the "Transactions" of the royal society of Edinburgh. Between 1840 and 1851 he made visits to the Alps of Switzerland and Savoy and to Norway, chiefly for the purpose of examining the glaciers. The fruits of his explorations were "Travels through the Alps of Savoy" (8vo., 1843, 2d ed. 1845); and "Norway and its Glaciers visited in 1851" (8vo., Edinburgh, 1853), which is perhaps the most complete description of the mountainous region of Norway yet published. Both works are illustrated. In 1855 appeared his "Tour of Mont Blanc and of Monte Rosa." He is now professor of natural philosophy in the university of Edinburgh.

FORBES, Sir John, a British physician and writer on medical science, born in Cuttlebrae, Banffshire, Scotland, in 1787. He was educated at Marischal college, Aberdeen, subsequently served in the medical department of the navy, receiving a war medal for his participation in several engagements, and in 1817, in company with his friend and fellow-student, Sir James Clark, took the degree of M.D. at the university of Edinburgh. After practising his profession at Penzance and Chichester, he removed to London, where he has since resided. His career as an author commenced in 1824, when he published translations of the works of Avenbrugger and Laennec on auscultation, following them up by an original work of his own on the subject. The appearance of these works, which have gone through several editions, formed an era in the practice of medicine in England. He was instrumental in founding the British medical association, one of the objects of which was to obtain information of the physical character of the country, with reference to its effect upon the health of the inhabitants, and to the "Transactions" of which he contributed an interesting paper on the "Medical Topography of the Hundred of Penrith." He was also the chief editor of the "Cyclopædia of Practical Medicine," a work of great value, and for 12 years conducted the

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"British and Foreign Medical Review," with signal ability and independence, retiring in 1848 a loser by the enterprise. He is the author of "Observations on the Climate of Penzance and Land's End" (London, 1828); "A Manual of Select Medical Bibliography" (8vo., London, 1835); "Illustrations of Modern Mesmerism" (8vo., London, 1846); "Treatise on Diseases of the Chest," and "Nature and Art in the Cure of Disease" (8vo., 1857); and of the following books of travel, which have enjoyed considerable popularity: "A Physician's Holiday; or, a Month in Switzerland during the year 1848" (8vo., 1849); "Memoranda made in Ireland in 1852" (1852); "Sight-seeing in Germany," &c. (8vo., 1855). He is physician in ordinary to the household of the queen, by whom he was knighted in 1853, physician extraordinary to Prince Albert, and a member of the principal medical societies of Europe and America.

FORCE, Peter, an American journalist and historian, born in New Jersey, Nov. 26, 1790. He removed to New York when a child, became a printer, and resided in that city till, in Nov. 1815, he removed to Washington, D. C. In 1820 he began the publication of the "National Calendar," an annual volume of national statistics, which he continued until 1836. From Nov. 12, 1823, to Feb. 2, 1830, he published the "National Journal," a political newspaper, which was the official journal during the administration of John Quincy Adams. From 1836 to 1840 he was mayor of Washington, and was afterward president of the national institute for the promotion of science. In 1833 he made a contract with the U. S. government for the preparation and publication of a documentary history of the American colonies, of which 9 folio volumes have since appeared, under the title of "American Archives." This work has occupied Mr. Force for 30 years, and in its prosecution he has gathered a collection of books, manuscripts, maps, and papers relating to American history, which in completeness and value is not equalled by any other collection in the world on the same subject. Mr. Force has also published 4 volumes of historical tracts, relating chiefly to the origin and settlement of the American colonies.

FORCELLINI, Egidio, an Italian lexicographer, born near Padua, Aug. 26, 1688, died April 4, 1768. Admitted into the seminary of Padua, his progress in the ancient languages induced his master Facciolato to make him his assistant in lexicographical labors. In 1718 they conceived the project of publishing a universal dictionary of the Latin language; but Forcellini being sent in 1724 to Ceneda as professor of rhetoric and director of the seminary, the execution of the task was suspended till his return in 1731. This great work, which was almost wholly executed by Forcellini, was designed to be complete for all ages of the language, in which every meaning assigned to a word should be illustrated by an appropriate example; and to this end Forcellini read with pen in hand not only the whole Latin literature, but all the collections of inscriptions and medals. He died before the work appeared in 1771, under the title of *Totius Latinitatis Lexicon, consilio et cura Jac. Facciolati opera et studio Ægid. Forcellini lucubratum.*

FORCHHAMMER, Johann Georg, a Danish geologist and chemist, born in Husum, Schleswig, July 26, 1794, became secretary of Oersted of Copenhagen, accompanied him on a mineralogical expedition to the island of Bornholm (1818–'19), and subsequently made several journeys in Great Britain, France, and Denmark at the expense of the Danish government. He occupies a high position in Copenhagen as a professor of geology and as a member of the academy of sciences, and has officiated as its secretary since the death of Oersted (1851). His principal works are *Danemarks geognostiske Forhold* (1885), and *Skandinaviens geognostiske Natur* (1843). He also excels as a lecturer on chemistry and mineralogy, and has written a manual of universal chemistry (*Laerebog i Stoffernes almindelige Chemie*, 1834–'5).

FORCIBLE ENTRY. In law, the phrase forcible entry and detainer means the unlawful and violent entry upon and taking possession or keeping of lands or tenements, with actual or threatened force or violence. In nearly all, and indeed, in some form, in all our states, there are laws respecting this which are usually very stringent. 1. It is regarded generally as an offence and made indictable, or treated as being so at common law. 2. An action is given for damages, or remedial process provided, by means of which the party entitled to possession may have it with the least delay compatible with sufficient inquiry into questions of right and title. The entry and detainer are usually spoken of together; but it seems to be settled that they are distinct offences. (1 Sargent and Rawles's Rep. 124; 8 Cowen's Rep. 226.) The Roman civil law, in its anxiety to preserve the peace of the community, made it a punishable offence even in an owner of an estate to take forcible and violent possession of it.

FORD, John, an English dramatist, born probably in Ilsington, Devonshire, in 1586, died there about 1640. At the age of 16 he was entered a student of law in the Middle Temple, and 4 years later he published a poem of little merit, entitled "Fame's Memorial," an elegy on the death of the earl of Devonshire. The taste for authorship which this production engendered did not, however, divert him from his professional duties. Having been regularly called to the bar, he practised law until 1638 or 1639, when he is supposed to have retired to his native place, as all trace of him ceases after this date. Poetry and dramatic composition were the recreations of his leisure hours, and after his professional labors had secured him an independent position, he became indifferent to the pecuniary profits of his plays, but finished them carefully and deliberately, appearing upon the stage at wide and irregular intervals, and mak-

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ing little effort to court the popular taste. In accordance with the practice common among the Elizabethan dramatists, at the outset of his career he wrote several plays in conjunction with some of his associates, not venturing before the public as an independent author until 1629. He is said to have assisted Webster in "A late Murther of the Sonne upon the Mother," a play which has been lost, and Decker in the "Fairy Knight" and the "Bristowe Merchant," which have likewise disappeared. He joined with Decker in writing the "Sun's Darling," a moral masque acted in 1623–'4, and published in 1657; and of the "Witch of Edmonton," written in conjunction with Rowley and Decker, the last act is ascribed to Ford. His own plays are: "The Lover's Melancholy" (1629), "'Tis Pity she's a Whore," "The Broken Heart," and "Love's Sacrifice" (1633), "Perkin Warbeck" (1634), "The Fancies Chaste and Noble" (1638), and "The Ladie's Triall" (1639). With the exception of the first and two last, these are of a deeply tragic character, and the horrible and even revolting stories which are developed in them are characteristic of the author's saturnine temperament. Lamb estimates him as of the first order of poets; but in the judgment of Hazlitt, Gifford, Jeffrey, Hartley Coleridge, and Hallam, he ranks after several of his contemporaries. The last places him at a considerable distance below Massinger. His versification is easy and harmonious, his declamation frequently elevated; and in his love passages, and particularly in the expression of deep sorrow—"the power over tears," as Hallam calls it—he had no superior among the dramatists of his age, although the emotion he portrays is never excited by heroic impulses, but by guilty or unfortunate love. He had not, in fact, the true dramatic fire, nor the elevation of a great poet. He wrote with extreme care, and hence there is an artificial elaborateness in his style, and a monotony in his poetry, which contrast unfavorably with the grace and vigor of several of his contemporaries. Of comic ability he was entirely destitute. "The Broken Heart," and "Perkin Warbeck," are commonly esteemed his finest plays. His complete dramatic works were first published in 1811, in 2 vols., edited by H. Weber. In 1827 appeared Gifford's edition in 2 vols. 8vo., and in 1847 an expurgated one in Murray's "Family Library." The most recent edition of Ford's works is that published in Moxon's series of the old English dramatists.

FORD, Richard, an English author, born in London in 1796, died at Heavitree, near Exeter, Sept. 1, 1858. He was educated at Winchester and at Trinity college, Cambridge, and was called to the bar at Lincoln's Inn, but never practised. The opening of the continent on the overthrow of Napoleon enabled him to gratify a taste for travel and collecting works of art, and he remained abroad for a number of years absorbed in those pursuits. In 1830 he visited Spain, where he spent several years in the study of the country and the people. Returning to England, he became a regular contributor to the "Quarterly Review," in which his articles on the life, literature, and art of Spain attracted much attention. He was the author of the "Handbook for Spain," published by Murray of London. The work appeared in 1845, in 2 vols. 8vo., and several editions have since been published, that of 1855 being much enlarged and partly re-written. It is the most learned and complete work of its class yet published, embodying within comparatively narrow limits a synopsis of the social and political condition and progress of the Spanish people, as well as full descriptions of places and events, and has been highly praised in England and America—in this country by Irving, Prescott, Ticknor, and other authorities on Spain. Mr. Ford's remaining publications are "Gatherings from Spain" (8vo., 1846), and "Tauromachia, the Bull Fights of Spain, with 26 illustrations" (imp. fol., 1852). His collection of books, prints, and pictures was one of the choicest in England.

FORDHAM, a post village in the town of West Farms, Westchester co., N. Y., on the New York and Harlem railroad, about 10 m. from New York city, and 8 m. from the Hudson river. It is the seat of St. John's college and St. Joseph's theological seminary, two prominent Roman Catholic institutions. The college, which stands on an eminence surrounded by magnificent grounds, was founded by the Rt. Rev. John Hughes, bishop (now archbishop) of New York, and was opened for students June 24, 1841, most of the professors being secular clergymen, and the Rev. John McCloskey, now bishop of Albany, first president. The college was invested by the legislature with university privileges, March 17, 1846; the first commencement for conferring degrees was held in July of the same year, and immediately afterward the place was transferred to the Jesuits, who broke up their establishment at St. Mary's college in Kentucky, and took charge of the institution at Fordham in Sept. 1846. The organization of the college combines the ordinary features of preparatory and grammar schools with those of a university. Students are received at any age, and there is a separate course of studies for those who do not wish to follow the classical branches. The younger pupils are kept apart from the elder, the 3 divisions into which the students are separated according to age and proficiency being allowed to have no communication with one another. In the senior class Latin is altogether spoken in the lectures and recitations. In July, 1859, the college contained 125 students, 36 of whom were in the university course. There were 18 professors and tutors, all but 3 of whom were Jesuits. The library has about 12,000 volumes. Connected with the college the Jesuits have a house of studies for members of the order, and a community of lay brethren, many of the former being also employed as professors or prefects in the college, and the latter having the principal charge of the domestic affairs, farm, gardens,

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&c. The lay brethren number about 25, and the scholastics (inmates of the house of studies), 12. There are 2 terms, the first lasting from the first Monday of September until Christmas, and the second from Jan. 2 until about July 15, when the annual commencement is held. The institution owns 40 acres of ground, stretching E. to the river Bronx, and laid out in beautiful pleasure grounds, gardens, orchards, woods, and cultivated fields. The buildings have little pretension to elegance, consisting mainly of an old country mansion and out-houses, to which many additions have been made as occasion has demanded, but it is designed soon to erect a handsome edifice on the same ground.—The theological seminary was founded by Bishop Hughes in 1841, and has always remained under his control. The Jesuits were employed to direct it when they took charge of the college, but they resigned their chairs in 1855, and the officers are now appointed by the archbishop. The faculty consists of a president, procurator, and professors of moral and dogmatic theology, French, rhetoric, and sacred music. The number of students in 1859 was 32. The seminary is an imposing building of gray stone, and has attached to it a parish church of the same material with a tall spire. The village contains 2 or 3 other churches, and is a favorite summer residence.—In Oct. 1776, immediately after the evacuation of New York by the British troops, the American army occupied a series of intrenched camps on the hills from Fordham heights to White Plains. Several pieces of cannon have been dug up, and the remains of earthworks and other fortifications are still seen in the vicinity.

FORDYCE, David, a Scottish philosopher, born in Aberdeen in 1711, died in 1751. He was educated at the university of his native city, where in 1742 he became professor of moral philosophy. He afterward went abroad and travelled through France, Italy, and other countries of Europe, but was lost in a storm off the coast of Holland. His most important works are: "Dialogues concerning Education" (2 vols. 8vo., London, 1745–'8); "Theodorus, a Dialogue concerning the Art of Preaching" (12mo., 1752); "Elements of Moral Philosophy" (12mo., 1754).

FORE, a nautical term, signifying a vessel's frame and machinery which lies near the stem. —Fore and Aft, from one end of the vessel to the other.—Fore Brace, a rope applied to the foreyard arm for the purpose of changing occasionally the position of the foresail.—Fore Tackle, the tackle which belongs to the foremast.

FORECLOSE, in law, to shut out, or exclude. Foreclosure means in law the act or method whereby a mortagee finally terminates the mortgageor's equity of redemption, or whereby a mortgagee shuts out, or for ever excludes, the mortgageor's right to annul the mortgage and repossess himself of the property mortgaged by payment of the debt or obligation to secure which the mortgage was given. (See Mortgage.)

FOREST, a N. W. co. of Penn., formed about the year 1851 out of the N. part of Jefferson co.; area, 376 sq. m. It is traversed by Clarion river, which is navigable by small boats. The surface is hilly and irregular. Some of the land is too rocky for cultivation, but the rest is moderately productive. The chief articles of export are pine timber and hard coal, the former of which is very abundant. Capital, Marion.

FORESTALLING. The original and exact meaning of this word, as a law term, was the buying of goods, and especially of any kind of food, on its way to market, with a view to sell it again at an enhanced price. Other law terms were used in a similar sense, as engrossing, which meant, probably, buying of a producer more than the buyer wanted for himself, to sell again at a profit to a consumer; also regrating, said to mean originally fraudulently lessening or dividing goods to sell again. These 3 terms were generally used together in the law. The third has dropped out of use in law and elsewhere. The second has become of common use in writing and speaking, in the sense of monopolizing and getting more than one's share of a thing. The first is not unfreqnently used ont of the law, in the sense of a wrongful and injurious anticipation; and in the law it seems to be extended to cover every device or act, or conspiracy with another, by any means to enhance the price of provisions above what might be deemed the natural price. This might be done by buying to sell again, or by spreading false rumors, or by misrepresentations as to facts which would affect the market, or by conspiring with others to obtain a monopoly or a command of the market, or to keep any articles of food out of the market. In all the United States there are statutes against forestalling, and it is sometimes regretted that they are not more frequently applied and enforced. But in this country it seems to be the practice, if not the theory, generally, if not always, to leave the regulation of these matters to the public intelligence and to the influence of a free and fair competition.

FORESTI, E. Felice, an Italian patriot, born in Conselice, near Ferrara, about 1793, died in Genoa, Sept. 14, 1858. After going through a course of study at the university of Bologna, he received the degree of doctor of laws, and found employment as a criminal lawyer before the tribunals of Ferrara. In 1816 he was appointed prætor of Crespino, which by the treaty of Vienna had been transferred from the papal to the Austrian dominions. The reaction incident to the reëstablishment of the latter authority had aroused an intense opposition, which led to an organized national movement for the liberation of Italy from foreign rule, and into this scheme Foresti entered with enthusiasm. The treason of an associate betrayed that section of the party to which he belonged, and he was arrested at abont the same time with Silvio Pellico, Gonfalonieri, Maroncelli, and other well known patriots. On Jan. 7, 1819, he was taken

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to Venice and incarcerated in the Piombi prison. After 2 years of suspense and captivity, aggravated by total isolation from family and friends, and frequent inquisitorial visits directed to the discovery of others implicated, which attempts were baffled by the prisoner's firmness, Foresti and his companions were conducted chained in couples to the square of San Marco, Dec. 24, 1821. There they mounted a scaffold while one of the judges read the sentence of death, which was followed however by an edict commuting their punishment to imprisonment for 20 years. They were detained until Jan. 12, 1822, in the island of St. Michael, and then escorted, again chained two and two, to Spielberg in Moravia, where they arrived after a painful journey of a month. The severe discipline of their long confinement in this fortress has become memorable through the record of Silvio Pellico, entitled *Le mie prigioni*. The emperor Ferdinand, on his accession in 1835, commuted the imprisonment of the Italian conspirators to perpetual exile in America. At the end of Nov. 1835, their chains were removed, and after a few months spent under guard at Gradisca in order to recruit their health, they were transported to Trieste, and thence sailed for New York. They landed on the last of Oct. 1836, and were received with respect and hospitality. Foresti soon became a favorite in society. He was appointed professor of the Italian language and literature in Columbia college, and for more than 20 years was the popular teacher of both in academies and private circles. For the use of his pupils he published an Italian reader (*Crestomazia Italiana*, 12mo., New York, 1847). In 1848 he went to Europe, but the reaction which followed the revolutions of that year obliged him to return to America. Failing health having impelled him to seek a milder climate, he sailed for Genoa, where he was appointed U. S. consul, in the spring of 1858. He died of a disease contracted in the discharge of his official duties, retaining to the end the firmness of will, clearness of mind, and affectionateness of disposition which had endeared him to so large a circle in Europe and America. His body, wrapped in the American flag, was borne to the cemetery of Staglieno by the sailors of the U. S. frigate Wabash, followed by a vast concourse of foreigners and natives.

FORESTS, Submerged. Remains of the growth of forests are found abundantly in the coal and in most of the formations of stratified rocks of more recent date. The occurrence of some of these collections has been referred to in the article Bog, and of the older deposits in Coal; see also Alluvium. Several instances are recorded of forests having been submerged in historic times, and being afterward seen still standing beneath the water. Lewis and Clark made mention of a forest of pines standing erect in the Columbia river about the year 1807. So extensive were these that some travellers were of opinion that a tract of land more than 20 miles in length had subsided vertically. Fremont, who visited the locality in 1845, satisfied himself that the forests had been submerged in consequence of immense land slides. De la Beche ("Geological Manual") cites numerous instances of submarine forests on the coasts of Cornwall, Yorkshire, Somersetshire, Scotland, and the Hebrides. These are often buried beneath alluvial deposits of sand, clay, and marl, and are only occasionally exposed to view, or brought to light when excavated in their continuation inland beneath the surface. They contain trunks, stems, branches, and leaves of trees of species resembling those growing upon the land. The vegetable stratum is sometimes a bed of peat and moss. Lyell refers to the upward and downward movement to which the crust of the earth is subject as a cause that might produce this phenomenon; and also mentions one instance where it might have occurred by the washing out and removal by the tide of a gravelly stratum supporting a peat bed.

FOREY, Élie Frédéric, a French general, born in Paris, Jan. 10, 1804. His mother was a daughter of an officer of Louis XVI. His uncle placed him in the college of Dijon, and he was subsequently admitted to the military school of St. Cyr, where Beuret, who was killed at the battle of Montebello, was in the senior class. He fought at Algiers, became a colonel in 1844, a general in 1848, aided in the *coup d'état* of Dec. 2, 1851, was appointed general of division in 1852, and officiated for a short time at the head of the French army at Sebastopol in 1854. Commander of the 1st division of the French army from 1857, he led it in the campaign of 1859 in Italy, drove back the Austrians who had attacked the advanced posts of Marshal Baraguay d'Hilliers, and gained the battle of Montebello, the first of the campaign (May 20), by holding the village of that name after a hand-to-hand combat of several hours' duration, inflicting a loss of about 2,000 men upon the Austrians, and capturing 200 of their soldiers and officers, while the French and Sardinian loss was estimated at not over 700. A note accompanying the great cross of the legion of honor, which was conferred on him by the emperor on May 21, certifies that he has been employed 36 years in active service, taken a part in 14 campaigns, and that he has been wounded 3 times. He took an active part in the subsequent battles in Italy, and was slightly wounded at the battle of Solferino (June 24, 1859), where the division under his command gained important advantages.

FORFAR, or Angus, a maritime co. of Scotland, bounded N. by Aberdeen and Kincardine, E. by the German ocean, S. by the frith of Tay, and W. by the county of Perth; length 36 m., breadth 30 m.; area, 889 sq. m.; pop. in 1851, 191,264. The surface of the N. W. division is in general mountainous and barren, but the great valley of Strathmore, which lies between the Benchennin and Sidlaw hills, is celebrated for its fertility, and that portion of the county which borders on the sea is level, fruitful, and highly cultivated. Agriculture is in a very advanced state. Wheat, oats, barley, potatoes,

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and turnips are extensively grown. With the exception of limestone and slate, there are no minerals of any importance in this county. Forfarshire is noted for its manufacture of coarse linen, the chief seat of which is at Dundee. Its rivers contain some valuable salmon fisheries. The principal towns are Forfar, Dundee, Montrose, Aberbrothwick, and Brechin.—Forfar, a parliamentary and royal borough of Scotland, capital of the above county, is situated in the valley of Strathmore, 13 m. N. of Dundee; pop. in 1851, 9,349. It has linen manufactures, and is a place of great antiquity.

FORFEITURE, in law, the loss of property as a consequence of some act which the law forbids and attaches this penalty to, or which the party has agreed not to do under the same penalty. Forfeiture is defined by Blackstone as a punishment which the law inflicts. It is so undoubtedly in all cases of forfeiture by crime; but we apprehend that it can be called punishment in the ordinary cases of civil forfeiture only as all consequences of wrong doing may be called punishment. Forfeiture was annexed by the law of England to many offences, as treason, felony, misprision of treason, præmunire, drawing a weapon upon a judge, or striking any person in the presence of any of the king's courts of justice. Lands and hereditaments were forfeited only upon attainder or corruption of blood; but forfeiture of goods and chattels took place upon conviction. Attainder, and the consequent forfeiture, were the most powerful instruments by which the greatest tyrants among the English monarchs endeavored to confirm and increase their power. Our fathers held them in so much dread and detestation, that the constitution of the United States (art. iii., sec. 3) declares that no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted. By the act of April 30, 1790, entitled "An act for the punishment of certain crimes against the United States," in which nearly all important offences are enumerated, section 24 provides "that no conviction or judgment for any of the offences aforesaid shall work corruption of blood or any forfeiture of estate." Forfeiture by crime is equally unknown in the legislation of the several states; so that it may be said to have no practical existence in this country.—Civil forfeiture may occur in 3 ways: 1. By operation of law, the principal instance of which at common law was the forfeiture of estates which were less than a fee, which was incurred when the holder made a conveyance of a greater estate than he held; as for example, if a tenant of land for life or years conveyed the land in fee, the grantee took nothing, but the whole estate of the grantor was forfeited to the remainderman, or reversioner. In the United States, however, a more just and rational rule prevails. With some diversity in its details, it may be generally expressed thus. 1. A grant of more than the grantor has operates as a grant of all he has, and as to all that is more it is void. 2. When certain conditions are annexed to an estate, either in the deed or devise or otherwise, at the original creation, the penalty of forfeiture may be annexed to those conditions, and will take effect if they be broken; as if A grants to B land, on condition that neither he nor any one claiming by or through him shall put up a certain building, or any building within a certain distance of one of the boundaries, or any other thing of like kind, then if any thing is done which violates the condition, the land is forfeited. It may be remarked, however, that the law does not favor conditions of this kind; and courts would construe them, where it could properly be done, either as giving a right to the grantor to abate and remove whatever thus violates the agreement, or as an injury for which compensation may be had in damages, leaving, in both cases, the estate undisturbed. 3. One may agree to pay a certain sum in case a less sum be not paid, or some other certain thing be not done, at a certain time. This is usually done by a bond; and the sum thus agreed to be paid is a penalty, which the courts of England and of the United States will reduce to the amount actually due. So one who becomes surety for another in a certain sum, that this other shall appear at a certain time, forfeits the sum if that other does not appear. The recognizance may then be estreated, as it is called. (See Estreat.) But on good cause being shown, courts have the power, and are usually willing to exercise it, to mitigate the penalty, and remit the forfeiture in whole or in part.

FORGE, a manufactory in which iron or steel is softened by heat and worked under the hammer. The term is also applied to works in which the native oxides of iron are reduced without fusion to a metallic state, and then forged into blooms or bars. Several forms of these are noticed in the article Bloomary. Forges differ from founderies and blast furnaces in their products being articles of wrought iron, while those of the latter are castings. The works in which the pig iron, obtained from the blast furnaces, is converted into malleable iron by the process termed puddling (see Iron), are commonly called puddling furnaces from one department of the operation; but they are also called forges from the hammering or rolling which succeeds the reduction process in the furnace. The term forging is equally applicable to the working of other malleable metals, as gold, silver, and copper, when these are heated and hammered into desired shapes.—The immense variety of articles into which iron is fashioned requires forges of various dimensions, and many of them adapted for special uses. They agree, however, in the general character of the apparatus with which they are furnished. The smith's forge, fitted for all sorts of small work, is the best representative of the smaller forges. It is provided, first, with a small open fireplace or hearth, upon a sort of table in brick work, 2

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feet to 2½ feet high. A chimney, open at the base, stands at one end, and a hood of sheet iron prevents the escape into the room of the vapors from the fire. Two fires are sometimes arranged under the same hood, and a double hearth is again obtained by building two hearths back to back, the same chimney having a flue for each fire. In the back wall of each hearth is fitted a cast iron plate or back, through which the perforated nozzle of the tuyere, or piece forming the extremity of the blast pipe, projects into the fire. The pipe connects with the bellows, which is so placed that the smith can work it with one hand, as he attends to the fire upon the hearth and the articles heating in it with the other. The fuel may be charcoal, bituminous coal, coke, or anthracite. Good hard wood charcoal is an excellent material, not only for its great calorific property, but more particularly for its freedom from sulphur, the presence of which in the mineral fuels often results in serious detriment to the iron exposed to its action. Upon the hearth are laid the various kinds of tongs required for holding the differently shaped pieces of iron. At the end opposite the chimney is a trough for water, into which the tools and work are dipped, as may be convenient, to cool them. It serves also, if kept scrupulously free from grease, for tempering articles of steel; and the water is also frequently sprinkled with a broom dipped in it over the fire, to check the combustion of the fuel at the surface. A stock of fuel is kept on the hearth by the trough, and as wanted it is drawn forward upon the fire. Conveniently near the hearth, and at the same height, is set the anvil, upon which the smith places the heated iron as he takes it from the fire. This portion of the apparatus is particularly described under its own name in this work. As the smith holds the hot iron upon the anvil with his left hand, he hammers it with the right, directing his blows and turning the work to receive the precise effect in a manner to be acquired only by long practice. If the work is heavy, he requires an assistant to aid the forging by striking with a heavy sledge, while he turns the piece to receive the blows, and strikes himself in turn with his hand hammer, tapping it at last upon the face of the anvil as the signal, universally adopted, for the blows to cease. Hammers are employed of a great variety of shapes and sizes adapted to the different kinds of work. There are also punches for driving holes through the soft iron, chisels of numerous shapes, and swaging tools, which are generally in pairs, and called top and bottom tools, the latter fitting by a tang into a hole in the anvil. When one of these is thus placed, the work is laid on its upper surface, and is then driven by the hammer till the soft iron receives the reverse form of the swaging tool; or the top tool, secured to a handle of twisted rods of hazel or other suitable wood, is held upon the surface of the work, and the assistant striking it with the sledge gives to the iron the form due to both swaging tools. By using two swaging tools, each presenting a straight semicircular groove, a square rod of iron may be beaten into a cylindrical form suitable for a round bolt. Pieces of iron hammered to a smaller size are said to be drawn down or reduced. The reverse process is called upsetting or jumping; in this operation the piece, heated either throughout, or only in the portion to be thickened, is set on end and struck. Another method of enlarging pieces of iron is by welding or building up; thus a head for a bolt may be made by bending a flat strip of iron around the end of the rod for the bolt, and causing these, when they are brought to the welding heat, to unite, by giving them a few light blows. The head may also be formed by heating the end of the rod and upsetting it, when it is soon enlarged by the hammer to the proper size. It may also be left on a large bar by drawing down the other portion of the bar to the required size.—For small operations a very convenient apparatus has within a few years been introduced, called a portable forge. It is a cast iron frame, supporting at top a small hearth and water trough, beneath which is the bellows, fitted with a treadle, by which it may be worked with the foot. This forge is much employed in various workshops, and is especially useful in operations requiring a forge for a short time only in any one place.—The great forges in which are fabricated the immense wrought iron shafts for ocean steamers present the same class of operations, with some new appliances, however, adapted to the gigantic scale upon which the work is done. The fires in these forges are either large reverberatories, or close furnaces, blown by a powerful fan blast. The work is commenced by introducing 15 to 20 pieces of square iron bound together, making, it may be, a bundle 6 feet long and 2 feet square, into the furnace. When one end is brought to a welding heat the mass is swung out suspended in chains from the great crane made for this use, and under the heavy hammer of 5 to 10 tons weight the pieces are made to unite. One long rod is left projecting on the line of the axis of the mass, and serves when swung in the crane as a guide rod, or porter, as it is called. By means of the pulleys which sustain the load running forward and back upon the jib of the crane, the mass is brought to any desired point within the area traversed by the swing of the crane; and by means of a cross lever or handle fixed to the end of the porter the men are enabled to turn the mass of iron while the other end of it is receiving upon the anvil the blows of the hammer. When the iron has been sufficiently hammered, it is returned to the furnace to be again heated, so as to extend the weld throughout the whole mass. After this a slab of wrought iron, called by the workmen a use, is welded on one side at the end of the piece, and under the hammer the shaft thus built up is drawn down to the required size. New additions are repeatedly made in this way until the desired length is obtained. Only the end of the shaft is thrust

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into the furnace, and the aperture which remains open around it is stopped during the heating by fire brick and clay. The end outside remains supported in the chains from the crane. The recently invented steam hammers employed in this work are described in the article HAMMER. By the use of this powerful machine the heavy shafts of ocean steamers are fabricated, the largest masses of iron forged in single pieces. The weight of the intermediate paddle shaft of the Great Eastern, or Leviathan, which was launched Jan. 30, 1858, is upwards of 22 tons, and that of the cranks 11 tons. Its length is 23 feet, and its diameter 2 feet 2 inches, and it is 2 feet in diameter at the main bearings. The cranks are 7 feet long between the centres. The screw shaft is 2 feet in diameter, and about 178 feet long, and its whole weight about 135 tons. The largest shaft yet made in the United States was produced at a forge in Reading, Penn., for the Collins steamer Adriatic. At the Atlantic forge in New York and the Franklin forge, other shafts have been made nearly as large. One at the former, made for the steamer Niagara, had a crank worked in the middle portion, and one near each extremity. The largest diameter was 19 inches, average about 17 inches. The extreme length was 29½ feet, to which should be added 3 feet more for the arms of each of the cranks, making 38½ feet in all. The bearings were 14½ and 15½ inches. The total weight was about 25,000 lbs.

FORGERY, in general, means the illegal falsification or counterfeiting of a writing. Although this offence is the subject of a great variety of cases in England and the United States, the definitions do not quite agree. That given in East's "Pleas of the Crown" (vol. ii. p. 852) is: "A false making of any written instrument for the purpose of fraud and deceit." This definition, he says, results from a comparison of all the authorities. But by making we must understand also addition, subtraction, or other material alteration, which indeed East himself admits; and by instrument, some paper or document which is intended to have and apparently may have some efficacy in law as the foundation of legal right or liability. Hence we regard as the best definition of forgery which we know that in Bishop's "Criminal Law," vol. ii. sec. 432: "Forgery is the false making, or materially altering, with intent to defraud, of any writing, which, if genuine, might apparently be of legal efficacy in the foundation of a legal liability." For it is not every falsification of writing which constitutes forgery in a legal sense. If one writes letters and signs them with the name of another, which may be very injurious not only to the feelings of some other party but to his interests, he is not in law a forger, if no pecuniary rights, obligations, or engagements are or are intended to be directly affected by this falsehood. The falsification need not be of a name, nor of the whole of an instrument. It is forgery if it relate to a single word, or even to a part of a word, as a letter, whereby the legal operation of it is materially changed; nor do we know why the same rule should not include a change only in the punctuation. Forgery may consist in the application of a false name to a true instrument, or of a true name to a false instrument, or even of a genuine name to a genuine instrument, if the name thus appended gives rights or imposes liabilities which the party appending it had no right to give or impose, and he appended the name falsely for the purpose of fraud and deception. If one employed to draw a will at the dictation of the testator, wrote it all as dictated, excepting that he inserted one or more legacies without direction, or one or more material provisions of any kind, and then presenting the will to the testator as written agreeably to his direction, thus obtained his signatnre, it has been held that this is a forgery. But in one case where a scrivener thus inserted a legacy to himself instead of to another, the English court of chancery, for the purpose of preserving the rights of the intended legatee, adjudged the legacy to the scrivener to be valid, and then ordered him to take it as trustee for the intended legatee. To constitute the forgery of a name, it must be the name of some person actually existing, or represented as actually existing; and if a name be written which belongs to a living man, but with an addition or description which corresponds to none that exists and prevents the name from attaching or belonging to any one, this is said not to be a forgery. The instrument need not be such that if genuine it would be certainly valid in law; but it must purport and appear on the face of it to have legal validity and efficacy; thus, in England, one may be convicted for the forgery of an unstamped note, although such a note could not be enforced any more than blank paper. It is said, however, that the falsification of an instrument which if genuine would be wholly illegal, that is, not merely void, but prohibited and itself an offence, is not forgery. When one forged the will of a living person, and, falsely representing him to be dead, obtained the money, this was held to be forgery; and on the other hand, when one falsely and fraudulently appended to a will the name of a person who never had existed, it was held to be forgery.—At common law, the publication or uttering of the forged instrument, or, in common phraseology, the making of any use of it, is not necessary to constitute forgery; thus, a man was convicted of forgery of a note, which he had made with fraudulent intent, but still retained in his pocket. In the United States, however, the statutes generally make the uttering or using the forged instrument essential to the offence. It may be well to remark that it is a well settled rule of law, that while an intent to deceive and defraud is an essential element of forgery, yet this intent is often conclusively presumed from the forgery itself; thus, if one forge a note, or any name upon a note, and cause it to be discounted, it is no defence whatever to the charge of

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forgery that he intended to pay the note himself, and had actually made adequate provision to take it up so that no person should be injured.—The crime of forgery was so easily committed, and detected with so much difficulty, and attended in some instances with such ruinous consequences, that it was not only a capital offence in England, but it was one of those offences for which it was very difficult to obtain a pardon. But the severity of the laws in relation to forgery is now more mitigated in England, and it is not a capital offence in any part of the United States.

FORGET-ME-NOT (*myosotis palustris*, Roth), a pretty little European plant, which grows almost every where, and assumes a varied aspect according to its situation. It is dwarf, rough, and hairy in dry places, as on old walls; but becomes larger and smoother in muddy ditches. It does well when planted in shady places in the garden, or even if cultivated in pots. Its flowers are borne in slender curving racemes, bending at the top like a scorpion's tail, whence it was called *M. scorpioides* by some. It has been successfully raised in the United States in places where there was abundance of water, either standing and stagnant, or in a running brook, where it produces many fine racemes of bright blue blossoms throughout the summer, which in many countries are considered the emblem of friendship. Independent of its sentimental character, its flowers are much prized. There are also two species of *myosotis* common to the United States at the northward, viz.: *M. verna* (Nuttall), a little, grayish, pubescent annual, from 5 to 12 inches high, with a very small whitish corolla, which grows upon dry rocks, where the soil is very thin and parched, the plant disappearing on the approach of hot weather; and the scorpion grass (*M. laza*, Lehm.), with a slender smoothish stem, from one to two feet long, branching, and bearing at the extremities of the branches racemes of bright blue, yellow-throated corollas, seen in summer in muddy bottomed ditches and rivulets, and near open springs of water. Professor Gray makes the latter a variety only of *M. palustris*.

FORK, an implement consisting of a handle and two or more prongs, used to lift certain substances more conveniently than with the unaided fingers. There are various kinds of forks, such as those used for agricultural, manufacturing, and domestic purposes. The last kind, which are of course the most used, possess a historical interest. Table forks do not seem to have been known in antiquity, though some archæologists, as Caylus and Grignon, have found articles among the rubbish in the Appian way and in the ruins of a Roman town in Champagne, which they considered to be table forks. The Jews and Etruscans did not use any at table, though they had forks for other purposes. The ancient Egyptians used a large fork for stirring the fire or water in the kitchens, and forks of wood were used by Egyptian peasants. The Greek word κρεαγρα signifies a fork, but merely a flesh fork, employed to take meat from a boiling pot, and not one used at table. The Latin words *furca*, *fuscina*, *furcilla*, and *fuscinula* are equally inapplicable to our modern forks. The first two were probably instruments which approached nearly to our furnace and hay forks. The *furcilla* was large enough for a weapon. The word *fuscinula*, which in modern times is used chiefly for a table fork, is not to be found in that sense in any of the old Latin writers. The old translations of the Bible only explain the Greek κρεαγρα by *fuscinula*. According to some records, the use of table forks seems to have been known in the 12th century, but only exceptionally. They are mentioned in the inventory of a prince's plate in 1379, but they did not come into more general use in Italy till the end of the 15th century. Galeotus Martius, in a book which he wrote upon Matthias Corvinus, king of Hungary (1458–1490), at whose court he resided, praises the king for eating without a fork, yet conversing at the same time, and never soiling his clothes. Martius states that forks were used at that time in many parts of Italy, but not in Hungary. He adds that meat was taken hold of with the fingers, which on that account were much stained with saffron, a condiment then put into sauces and soups. In the 16th century forks were not yet used in Sweden, and at the end of that century they were entirely new even at the court of France. In the convent of St. Maur in France, the introduction of forks was opposed as sinful by the old and conservative monks, and advocated by the young and progressive bretbren. In other monasteries, too, the use of forks was for a considerable time forbidden, and considered a superfluous luxury. Thomas Coryat, who travelled in 1608 on the continent, and published in 1611 an account of his travels under the title of "Crudities," says: "J observed a custome in all those Italian cities and townes through the which j passed, that is not used in any other country that j saw in my travels, neither do j thinke that any other nation of Christendome doth use it, but only Italy. The Italians, and also most strangers that are commorant in Italy, do alwaies at their meales use a little forke when they cut their meate. This form of feeding j understand is generally used in all places of Italy; their forkes for the most part being made of yronn or steele, and some of silver, but these are used only by gentlemen. The reason of this their curiosity is, because the Italian cannot by any means indure to have his dish touched with fingers, seeing all men's fingers are not alike cleane. Hereupon I myself thought good to imitate the Italian fashion by this forked cutting of meate, not only while J was in Italy, but also in Germany, and oftentimes in England since j came home; being once quipped for that frequent using of my forke by a certain learned gentleman, a familiar friend of mine, one Mr. Laurence Whitaker, who in his merry humour doubted not to call me at table *furcifer*

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only for using a forke at feeding, but for no other cause." The use of forks was at first much ridiculed in England; in one of Beaumont and Fletcher's plays "your fork-carving traveller" is spoken of very contemptuously; and Ben Jonson has also ridiculed them in his "Devil is an Ass:"

> The laudable use of forks,
> Brought into custom here as they are in Italy,
> To the sparing of napkins.

Dr. Johnson asserts that among the Scotch highlanders even knives have been introduced at table only since the time of the revolution. The English, Dutch (*vork*), and French (*fourche*) have adopted the Italian names *forca* and *forchetta* for table forks, though these names were probably used at an earlier period to denote pitchforks, flesh forks, and other large instruments, for which formerly the Low German name was *Forke*. The German word *Gabel* is of great antiquity, and has often been doubtfully connected with the Latin *gabalus*. In Spain forks continued to be rarities till a comparatively late period. In the interior of Russia they are still not much in use. The Chinese use no forks, but have instead small sticks of ivory which are often of fine workmanship inlaid with silver and gold. Elsewhere in Asia and Africa, except among European settlers, forks are unknown.

FORLI, a legation of the Papal States, bounded N. by the legation of Ravenna, E. by the Adriatic, S. by San Marino and the legation of Urbino e Pesaro, and W. by Tuscany; area, about 900 sq. m.; pop. in 1853, 218,433. On the coast and for some distance inland the surface is low and level, but the W. part is traversed by branches of the Apennines. The principal productions are grain, hemp, flax, madder, saffron, anise, bees, and silkworms. No mineral of much value is found except sulphur, which is abundant. Earthquakes happen frequently. The interior suffers much from drought, while the inhabitants of the N. E. are perhaps equally afflicted by unwholesome marshes, which occupy a large proportion of the land. Manufactures have made more progress than in any other part of the Papal States.—FORLI (anc. *Forum Livii*), the capital of the above legation, is a handsome walled town on the ancient Æmilian way, 38 m. S. E. of Bologna, situated in a fertile plain at the foot of the Apennines, between the rivers Ronco and Montone; pop. 16,000. Its cathedral contains the tomb of Torricelli. Of the 9 other churches, the most interesting is probably that of San Girolamo, where rests the body of King Manfred. The town hall is remarkable for its council chamber, decorated with frescoes by Raphael. One of its palaces (the Palazzo Guerini) is built after designs by Michel Angelo. There are 23 convents. The manufactures are silk ribbons, silk twist, oil cloth, woollen goods, wax, nitre, and refined sulphur. The city is said to have been founded in 207 B. C. by the consul M. Livius Salinator, and to have been named in his honor. It constituted a republic at one period in the middle ages, changed masters frequently during the wars of the Guelphs and Ghibellines, was added to the Papal States by Pope Julius II., taken by the French and made the capital of the departuent of the Rubicon in 1797, and restored to the Roman see in 1814.

FORLI, MELOZZO DA, an Italian painter, flourished in the 15th century. He was the first who applied the art of foreshortening to the paintings of vaulted ceilings. About 1472 he painted the "Ascension" in the great chapel of the Santi Apostoli at Rome for Cardinal Riavio. In 1711, when the chapel was being rebuilt, this painting was cut out of the ceiling and placed in the Quirinal palace, where it still remains.

FORLORN HOPE, a military phrase, designating a body of men selected from an army for the performance of peculiarly dangerous or desperate duties, such as leading the assault upon a fortress or heading a perilous charge in battle. They are usually volunteers, and those who survive are generally liberally rewarded. The French term is *enfans perdus*. Lord Byron calls them

> The full of hope; misnamed forlorn.

FORMES, KARL JEAN, a German vocalist, born in Mühlheim on the Rhine, Aug. 7, 1816. His father trained him to an ecclesiastical life, and for several years he discharged the duties of sacristan in his native town. Gifted by nature with a bass voice of great power and compass, he soon attracted attention by his singing in the church choir, and was induced to go upon the stage. He made his début at Cologne in 1841 in the part of Sarastro in Mozart's *Zauber-Flöte*. In 1845 he appeared in Vienna, and 5 years later was engaged as first basso singer at the Italian opera, Covent Garden, London, to compete with Lablache, then singing at the queen's theatre. During the next 6 or 7 years he sang with great success in the principal capitals of Europe, particularly London, and in the latter part of 1857 made a professional visit to the United States, in the chief cities of which he has since repeatedly appeared. In addition to his vocal powers, Formes possesses great dramatic abilities, and in serious parts is scarcely less distinguished as an actor than as a singer. Since the death of Lablache he is unsurpassed, if not unrivalled, for capacity of voice and finish and vigor of style. He assumes tragic or comic parts with equal facility. Among those which he has most thoroughly identified with himself are Marcel in the *Huguenots*, Leporello in *Don Giovanni*, Figaro in *Figaro's Hochzeit*, Sarastro in the *Zauberflöte*, Bertram in *Robert le Diable*, Figaro in the "Barber of Seville," &c.

FORMIC ACID (Lat. *formica*, an ant), so named from its being found in the bodies of ants, is artificially prepared by dissolving sugar, starch, or tartaric acid in water, adding sulphuric acid, and distilling the mixture on peroxide of manganese. Carbonic acid gas escapes, and formic acid mixed with water distils over. It is colorless and transparent, strongly acid, of

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specific gravity 1.1168, its composition represented by the formula C_2 HO_2 HO.

FORMOSA (Portuguese, *Ilha Formosa*, beautiful island; Chinese, *Tai-wan*, the terraced harbor), an island in the China sea, between lat. 21° 58′ and 25° 15′ N., and long. 120° and 122° E., separated from the Chinese province of Fo-kien by a channel 80 m. wide; length 250 m.; greatest breadth about 80 m.; area 15,000 sq. m.; pop. probably about 2,000,000. A range of mountains occupies the eastern part of the island, running from N. to S. through its entire length. As some of the summits are covered with perpetual snow, their height cannot be less than 12,000 feet. Among these mountains are several extinct volcanoes, and sulphur, naphtha, and other volcanic products are found in abundance. The E. coast is high and bold, and is entirely destitute of harbors. The W. shore is flat, and has some good ports accessible to vessels of moderate draught. Ke-lung, at the N. end of the island, is the best harbor, and is accessible to large vessels, though it is not safe from the violent typhoons to which the sea around Formosa is peculiarly subject. The W. part of the island is a very fertile plain, watered by numerous small rivers, running from the mountains to the sea. It is well cultivated, and presents the appearance of a vast garden. The chief productions are rice, sugar, camphor, tobacco, wheat, maize, beans, radishes of great size, pepper, coffee, tea, indigo, cotton, flax, silk, and oranges, peaches, plums, and a great variety of other fruits. The wild animals are leopards, tigers, wolves, and deer. Pheasants are very plentiful. The ox and buffalo are used in tillage, and horses, asses, sheep, goats, and hogs are numerous. Gold is found in the mountains, and there are mines of bituminous coal in the N. part. Sulphur and salt are also found. The commerce of the island with the mainland of China is very extensive, and employs a great number of junks. Its exports are rice, of which 500 junk loads are annually sent to China, sugar, beans, sulphur, camphor, and timber. It imports saltpetre, opium, and manufactured goods of all kinds. Of late years it has been much visited by American ships for purposes of trade. The western and most fertile part of the island is inhabited by Chinese, who have emigrated to Formosa in great numbers during the last 2 or 3 centuries. They are industrious and prosperous, skilful cultivators of the soil, and enterprising merchants. Capt. Eagleston, a Salem shipmaster who visited Formosa in 1857, describes them as civil and hospitable, and living in plenty; beggars, so numerous on the mainland of China, being entirely unknown among them. The women are small and coarse in appearance, with universally small feet. The capital of the island is Tai-wan, on the S. W. side, several miles from the sea. Northward of Tai-wan is the town of Tamsawy, with a population of about 6,000. The E. and mountainous part of Formosa is independent of the Chinese, and is inhabited by a warlike race of copper-colored barbarians, of whom the Chinese are in great dread, and with whom they are almost constantly at war. They resemble the aboriginal inhabitants of the Philippine islands in appearance, and are probably of the Malay division of mankind. They wear their hair long, have rings in their ears, and are clothed only with a piece of cotton stuff wrapped about the middle. They dwell in bamboo cottages raised on terraces 3 or 4 feet high. They have no written language, and do not appear to have any priesthood. Their government is patriarchal, petty chiefs and councils of elders ruling them in the manner of the American Indians. The Chinese represent them as honest and friendly among themselves, but as excessively fierce and revengeful. One of the officers of the U. S. steamer John Hancock, which visited Formosa in 1855, describes them as being of large stature, fine forms, copper color, high cheek bones, heavy jaws, with coarse black hair reaching to the shoulders, and a manly, independent bearing. Their arms are lances, bows and arrows, and a few Chinese matchlocks. In their language the island is termed Kaboski, and also Gadavia. Some of these people have been subdued by the Chinese, and are kept in small villages in a kind of predial servitude.—Formosa does not seem to have been known to the Chinese till the 15th century. In 1582 a Spanish ship was wrecked there, and the survivors brought the first account of the island to Europe. In 1634 the Dutch took possession of it and built several forts and factories, but in 1662 they were driven out by a famous Chinese pirate, Coxinga, who made himself king of the W. part, and transmitted the sovereignty to his descendants, who, however, submitted in 1683 to the authority of the Chinese emperor, to whom it has since been tributary. The Chinese colonists have frequently rebelled, and in 1788 an insurrection broke out which cost the imperial government 100,000 lives and an immense expenditure of money before it was suppressed. Psalmanazar, whose extraordinary imposture excited so much attention in England in the early part of the last century, pretended to be a native of Formosa, and published an account of the island which was entirely fictitious.

FORREST, Edwin, an American actor, born in Philadelphia, March 9, 1806. From an early age he manifested a predilection for the stage, and in his 12th year performed female parts in the old South street theatre in Philadelphia. A year later he assumed male parts, and on Nov. 20, 1820, made his début at the Walnut street theatre as young Norval in Home's tragedy of "Douglas." A protracted professional tour in the western cities of the Union ensued, and Forrest returned to the seaboard with considerable reputation for histrionic ability. After successful engagements at Albany and Philadelphia, he appeared before a New York audience in July, 1826, in the part of Othello. His fine natural capacities and the vigor of his per-

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sonation made a favorable impression, and the popularity he subsequently enjoyed may be said to date from this occasion. For several years he acted in the principal theatres of the Union, appearing as Othello, Macbeth, Hamlet, Richard III., and in other prominent Shakespearean parts, and also in a number of plays by American authors, the most successful of which were "Metamora," written for the actor by John A. Stone, the "Gladiator," by Dr. Bird, and "Brutus," by J. Howard Payne. The part of Metamora, and that of Spartacus in the "Gladiator," continue to be among the most popular and effective that he has assumed. In 1834 he visited England and acted his principal characters with considerable success, for which he acknowledged his obligations to Mr. Macready, who had shown him much attention. During a second visit to England in 1837 he was married to Miss Sinclair, daughter of the well known singer of that name, with whom he returned to the United States in 1838. In 1844 he went a third time to England, remaining there 2 years. On this occasion a rupture occurred in the friendly relations which had previously subsisted between Mr. Forrest and Mr. Macready, and to the zeal with which Mr. Forrest's friends espoused his quarrel has been ascribed the serious riot which took place in Astor place, New York, May 10, 1849, during an engagement of Mr. Macready at the Astor place opera house. In the same year Mr. Forrest separated from his wife for alleged misconduct on her part. Subsequently she brought an action for divorce against him on the ground of infidelity, and in Jan. 1852, obtained a verdict in her favor, with an annual allowance of $3,000 as alimony. The appeal which Mr. Forrest took from this decision is still (July, 1859) before the courts of New York. He withdrew from the stage in 1858, having played with undiminished effect until the close of his career, and accumulated a fortune by his professional labors. His fame rests chiefly upon his personation of characters demanding robust action and physical power, such as Jack Cade, Spartacus, and Metamora.

FORRESTER, Alfred Henry, better known by his *nom de plume* of Alfred Crowquill, an English author and artist, born in London in 1806. He was brought up to be a stock broker, but at the age of 15 commenced the career of an author by publishing a variety of papers in the magazines. A few years afterward he took up drawing with a view of illustrating his own works, and first appeared before the public in the joint capacity of author and artist in 1826 in "Eccentric Tales." He was afterward one of the contributors of the "Humorist" papers to Colburn's "New Monthly Magazine," and subsequently was connected with "Bentley's Miscellany" during the editorship of Dickens. He was also among the first illustrators of "Punch" and the "Illustrated London News." Of late years he has been an exhibitor of pen-and-ink drawings at the royal academy, and has painted pictures in oil. He designed a statuette of the duke of Wellington, which was presented to the queen. Among his works are the "Wanderings of a Pen and Pencil," "Comic Arithmetic," "Phantasmagoria of Fun," "A Bundle of Crowquills," and a variety of scrap books and fairy tales, most of which are of a humorous character and are illustrated by himself.

FORSKAL, Peter, a Swedish traveller and naturalist, born in Kalmar in 1736, died in Yerim, Arabia, July 11, 1763. He studied in the university of Göttingen, and under Linnæus at Upsal, published a thesis in opposition to the then dominant philosophy of Wolf, and incurred the displeasure of government by a treatise on civil liberty. He was appointed to a professorship in the university of Copenhagen, and by recommendation of Linnæus was attached with Niebuhr and others to the scientific expedition sent to Egypt and Arabia by the king of Denmark. He departed in 1761, and during the 2 years preceding his death by the plague collected materials for 3 important works descriptive of the fauna and flora of the East, published under the editorial care of Niebuhr.

FÖRSTER, Ernst Joachim, a German painter and writer upon art, born in Münchengosserstädt, April 8, 1800. After studying theology, philosophy, and philology at Jena and Berlin, he devoted himself to painting, became the pupil of Cornelius at Munich in 1823, and was employed upon frescoes at Bonn and Munich till in 1826 he visited Italy. At Pisa, Bologna, and other cities, he collected interesting materials for a history of Italian art, and at Padua in 1837 discovered and restored the frescoes in the chapel of St. George, and made a valuable collection of designs from the old masters. Since returning to Munich he has written numerous works, chiefly on the history of art.

FORSTER, George, an English traveller, died in Nagpoor in 1792. He was in the service of the East India company, and in 1782 undertook an overland journey from India to Russia. Disguised as a Mussulman merchant, and able to speak Hindoo, Persian, and the Mahratta dialect with facility, he proceeded by Bellaspoor and Jambo through the vale of Cashmere, which had been visited before by no European traveller except Bernier. He passed by Cabool, Candahar, and Herat, to the southern coast of the Caspian sea, and travelled thence through Russia, arriving in England in 1784. After publishing "Sketches of the Mythology and Customs of the Hindoos" (London, 1785), he returned to Calcutta, where in 1790 appeared the first volume of his "Journey from Bengal to England," &c. It was republished in London in 1798, together with the second volume, which was printed from his manuscripts.

FÖRSTER, Heinrich, one of the greatest living pulpit orators of the Roman Catholic church in Germany, born at Grossglogau, Prussian Silesia, Nov. 24, 1799, studied theology in Breslau, was ordained as priest in 1825, appointed canon of the cathedral in 1837, afterward inspector

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of the theological seminary and preacher at the cathedral, opposed with great zeal the influence of Ronge, became in 1848 a member of the Frankfort parliament, attended, in Nov. 1848, the synod of the German bishops of Würzburg, and was made in 1853 prince-bishop of Breslau.

FORSTER, JOHANN REINHOLD, a German traveller and naturalist, born in Dirschau, Prussia, Oct. 22, 1729, died in Halle, Dec. 9, 1798, was descended from an exiled Scottish border family. He was educated at Halle and Dantzic for the clerical profession, and in 1753 became pastor at Nassenhuben, near Dantzic, but devoted himself especially to the study of mathematics, philosophy, and geography. In 1765 he went with his son Johann Georg as an agent of the Russian government to investigate the condition of the colony at Saratov in southern Russia, but received only slight recompense for his labors, and in the following year repaired to London. He was for a time professor of natural history and of the French and German languages at Warrington, in Lancashire, and in 1772 accompanied Capt. Cook on his second voyage to the south seas, being engaged as naturalist of the expedition. After his return he furnished many materials to his son, the historian of the expedition, and published his botanical observations in a special work (London, 1776), and also "Observations made during a Voyage round the World on Physical Geography, Natural History, and Ethic Philosophy" (London, 1778). The government did not aid him in these publications, regarding the narrative of his son as an evasion of the conditions of his engagement, and not being satisfied with some reflections contained in that work. Imprisoned for debt, he was released chiefly through the interest of Duke Ferdinand of Brunswick, received the degree of doctor of laws from Oxford, and in 1780 was appointed professor of natural history at Halle, an office which he retained till his death. His quickness of temper and plainness of speech exposed him to many vexations, and his love of play and passion for increasing his collections at whatever expense also involved him in difficulties; but his intellectual acuteness and wonderful memory gave value and success to his lectures and publications. He wrote and spoke 17 languages, could be peculiarly charming in conversation, and was familiar with general and especially with classical literature. Among his works, beside those above mentioned, are *Liber Singularis de Bysso Antiquorum* (London, 1776); *Zoologia Indica* (Halle, 1781); *Beobachtungen und Wahrheiten* (Berlin, 1798); and *Geschichte der Entdeckungen und Schifffahrten im Norden* (Frankfort, 1784). The last was translated into English (London, 1786), and contains much useful information and ingenious conjecture, together with many ill-natured reflections, particularly on the English.—JOHANN GEORG ADAM, eldest son of the preceding, a German traveller and naturalist, born in Nassenhuben, Nov. 26, 1754, died in Paris, Feb. 12, 1794. After accompanying his father to Saratov, he studied nearly a year in St. Petersburg, and went thence to England, where he gave instruction in French and German, and translated several works into English. He went with Cook on his second voyage round the world, a narrative of which he published after his return, receiving scientific notes for it from his father, thus eluding the agreement by which the elder Forster was virtually prohibited from publishing a narrative. After residing in Paris and Holland, he was for 6 years professor of natural history in Cassel, whence in 1784 he passed to the same professorship in Wilna. He was appointed historiographer to an expedition round the world under the patronage of the empress of Russia, but the project was prevented by the Turkish war. He became librarian to the electoral prince of Mentz, but in 1792, on the occupation of that city by the French, he engaged actively in support of republican principles, and in 1793 was sent to Paris as agent of Mentz to solicit its incorporation with France. After the recapture of that city by the Prussians, Forster lost all his property, his books, and his MSS., and resolved to go to India, but died while studying the oriental languages in Paris. He is accounted one of the classical writers of Germany. Alexander von Humboldt says in his "Cosmos": "The writer who in our German literature, according to my opinion, has most vigorously and successfully opened the path of the scientific study of nature, is my celebrated teacher and friend, George Forster. Through him began a new era of scientific voyages, the aim of which was to arrive at a knowledge of the comparative history and geography of different countries. Gifted with delicate æsthetic feelings, and retaining a vivid impression of the pictures with which Tahiti and the other then happy islands of the Pacific had filled his imagination, as in recent times that of Charles Darwin, George Forster was the first to depict in pleasing colors the changing stages of vegetation, the relation of climate and of articles of food in their influence on the civilization of mankind, according to differences of animal descent and habitation. All that can give truth, individuality, and distinctiveness to the delineation of exotic nature is united in his works. We trace not only in his admirable description of Cook's second voyage of discovery, but still more in his smaller writings, the germ of that richer fruit which has since been matured." Beside numerous translations, his most important works are on subjects of natural history and ethnology, as *Kleine Schriften, ein Beitrag zur Länder-und Völkerkunde, Naturgeschichte und Philosophie des Lebens* (6 vols., Berlin, 1789–'97), and *Ansichten vom Niederrhein, von Brabant, Flandern, Holland, England, und Frankreich* (3 vols., Berlin, 1791–'94). He was the first to translate into German the *Sacontala* of Kalidasa. His widow, the daughter of Heyne, afterward known as Therese Huber, published a collection of his letters (2 vols., Leipsic, 1828–'9). His

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complete works were edited by his daughter, with a critical notice by G. G. Gervinus (9 vols., Leipsic, 1843–'4).

FORSTER, John, an English journalist and author, formerly editor of the London "Examiner," born in Newcastle in 1812. He was educated at the university of London, and was a member of its first law class. With his classmates he established the "London University Magazine," out of which grew the "Englishman's Magazine," among his contributions to which was a series of biographical articles on the "Early Patriots of England," which were subsequently enlarged into his "Lives of the Statesmen of the Commonwealth," making 5 vols. in "Lardner's Cabinet Cyclopædia," and republished in New York, in 1847. It is especially exact in its facts, contains much information not before published, and forms a complete and lucid narrative of the political events of the period of which it treats. Mr. Forster pursued the study of law under Chitty, and was called to the bar, but soon became a valued contributor to periodicals. In 1834 he connected himself with the "Examiner," of which he became the sole editor in 1846, and from the time of his first connection he contributed largely to every number of it, in both the departments of politics and literary criticism. He was also for 4 years the editor of the "Foreign Quarterly Review," and for a short time of the "Daily News" after the retirement of Mr. Dickens. In 1848 appeared his "Life and Adventures of Oliver Goldsmith," which was enlarged into the "Life and Times of Oliver Goldsmith" (1854), a graceful and thorough biography, of which also an abridgment has been published with the same title. He has frequently contributed to the "Edinburgh" and the "Quarterly" reviews, from the former of which his lives of Defoe and of Charles Churchill have been reprinted. His historical and biographical essays were collected in 2 vols. in 1858. In 1856 he was appointed secretary to the commission of lunacy, a place worth about £1,600 a year, and the same year he married the widow of Mr. Henry Colburn (the well-known publisher), a lady of ample fortune.

FORSTER, Thomas Ignatius Maria, an English meteorologist, born in London, Nov. 9, 1789, died about 1850. He was early interested in natural sciences, and published a "Journal of the Weather" in his 16th year. He had attracted attention by publications on the influence of the atmosphere and of spirituous liquors upon health, and on the natural history of the swallow, when in 1812 he went to the university of Cambridge, where in the following year he produced an annotated edition of Aratus. He associated himself with Spurzheim in propagating the system of phrenology, edited an edition of Catullus (1816), and published "Observations on the Influence of Particular States of the Atmosphere on Human Health and Diseases" (London, 1817). On July 3, 1819, he discovered a comet which was seen on the same night from the observatory at Greenwich. He soon after settled on his estate in Hartwell, Sussex, where he subsequently resided, frequently visiting the continent. Beside many papers in the "Philosophical Magazine," his principal writings are the "Perennial Calendar" (London, 1824); "Pocket Encyclopædia of Natural Phenomena" (London, 1827), a compendium of prognostications of the weather; *Beobachtungen über den Einfluss des Luft-Drucks auf das Gehör* (Frankfort, 1835); *Observations sur l'influence des comètes* (1836); the whimsical *Annales d'un physicien voyageur* (Bruges, 1850); *Epistolarium Forsterianum* (Brussels, 1852), a collection of original letters from eminent men (Locke, Tillotson, Warton, Cromwell) preserved in the Forster family; and several poems and philosophical writings.

FORSYTH. I. A N. W. co. of N. Carolina, bounded W. by Yadkin river, and drained by its affluents; area, about 250 sq. m.; pop. in 1850, 11,168, of whom 1,353 were slaves. The surface is much diversified. The soil is generally fertile, and the staples are wheat, maize, and oats. In 1850 the productions amounted to 40,735 bushels of wheat, 349,320 of Indian corn, and 97,659 of oats. The county contained 2 factories, 27 mills, and 16 churches. It was formed in 1849 of the southern part of Stokes co. Capital, Winston. II. A N. co. of Ga., bounded E. and S. E. by the Chattahoochee river; area, about 250 sq. m.; pop. in 1852, 8,579, of whom 1,020 were slaves. The surface is hilly, and in some places mountainous. The soil is everywhere of fair quality, and in the vicinity of the rivers is alluvial and extremely fertile. Cotton, grain, and potatoes are the staples, and in 1850 the productions amounted to 472 bales of cotton, 339,954 bushels of Indian corn, 72,855 of oats, and 78,333 of sweet potatoes. There were 28 churches and 405 pupils attending public schools. The county is remarkably rich in minerals. Silver, copper, and considerable quantities of gold are obtained, and diamonds and other precious stones have occasionally been found. Named in honor of John Forsyth, an eminent statesman of Georgia. Capital, Cumming. Value of real estate in 1856, $786,228.

FORSYTH, John, an American senator and secretary of state under Presidents Jackson and Van Buren, born in Frederic co., Va., about 1781, died in Washington, Oct. 21, 1841. He was graduated at Princeton college in 1799, and was admitted to the bar in Augusta, Ga., in 1802. He was elected attorney-general of the state in 1808, representative in congress in 1812, and U. S. senator in 1818. In 1820 he was sent to Spain as resident minister, where he conducted the negotiations concerning the ratification and execution of the treaty by which Florida was ceded to the United States. In 1823 he was again chosen to the house of representatives, and was one of the main supporters in congress of Gov. Troup of Georgia in his contest with the national government

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concerning the removal of the Creek and Cherokee Indians. He became governor of Georgia in 1827, and in 1829 was again returned to the U. S. senate. He was a delegate to the anti-tariff convention called at Milledgeville in 1832, but withdrew from it on the ground that it did not fairly represent the people of Georgia; and he opposed the South Carolina movement of nullification from its beginning, and voted in favor of Mr. Clay's compromise act of 1833. In the debate in 1834 on the removal of the deposits from the U. S. bank, he supported the president, who afterward appointed him secretary of state, an office which he retained till the retirement of President Van Buren in 1841.

FORT BEND, a S. E. co. of Texas, intersected by Brazos river, which is navigable by steamboats during part of the year, and touched on the S. W. by Bernard river; area, 920 sq. m.; pop. in 1858, 4,134, of whom 2,714 were slaves. In the valleys of the streams the soil is alluvial and fertile. The rest of the county, consisting principally of prairies, is less productive, but furnishes abundant pasturage. Timber is found in the river bottoms, Brazos and Bernard rivers being skirted by a thick growth of oak, ash, elm, and red cedar. The staples are cotton, sugar, Indian corn, and live stock. In 1850 the productions amounted to 2,465 bales of cotton, 100 hogsheads of sugar, 135,205 bushels of Indian corn, and 53,330 of sweet potatoes. There were 4 churches, several academies, and 120 pupils attending public schools. Value of real estate in 1858, $1,228,140. Capital, Richmond.

FORT DES MOINES, the capital of Iowa, a flourishing post town of Polk co., and one of the most important places in the interior of the state; pop. in 1856, 3,830. It is built at the junction of the Des Moines and Raccoon rivers, the former of which, on the completion of improvements now in progress, will be navigable thus far by steamboats. The water power furnished by the two streams is employed in several flour and saw mills. Timber is abundant in the vicinity, and productive coal mines have been opened. A newspaper is published in the town. For many years this was a military station in the midst of the Indian country, but the old fort was abandoned in 1846. The name of the town has recently been changed to Des Moines.

FORT LARAMIE. See Laramie.

FORT LEAVENWORTH, a military post of Kansas, on the W. bank of the Missouri, 398 m. above its mouth, and 31 m. above the junction of the Kansas river. It was established in 1827, is important as a general rendezvous for troops proceeding westward, and as a depot for all the forts on the great Santa Fé and Oregon routes. It is the intersecting point of nearly all the great military roads of the territories, one running S. into Texas, one S. W. to Santa Fé, one W. to Fort Riley, and a fourth N. W. to posts in Nebraska, Utah, Oregon, California, etc. It is rapidly improving in appearance, being laid out in streets, on which stand buildings for the troops, warehouses, quartermaster's establishment, stables for 8,000 horses and 15,000 mules, &c. The barrack is a large edifice, 3 stories high, and the hospital was built at a cost of $12,000 or $15,000. Connected with the fort are several large farms. Leavenworth City is about 2 m. distant.

FORT MADISON, the capital of Lee co., Iowa, situated on beautiful rising ground on the Mississippi, 12 m. above the lower rapids; pop. in 1853, about 3,000. It was the site of a frontier fort erected by the government in 1808 as a defence against the Indians. The garrison was forced to evacuate it in 1813, when it was burned, and few traces of it now remain. The village is pleasant and healthy, well built, with a good proportion of brick houses, a substantial court house, and 5 or 6 churches. It is the seat of the state penitentiary, a fine limestone building, and is connected with the opposite side of the river by a steam ferry. In manufactures it has progressed more rapidly than any other town in the state. Its commerce is extensive, and it is a depot and shipping point for immense quantities of lumber, grain, and pork. Two newspapers are published here.

FORT RILEY, a military post of Kansas, established in 1853, at the junction of Republican and Smoky Hill forks of Kansas river, on the great emigrant route to New Mexico and California, 140 m. from Fort Leavenworth. With the latter place it is connected by an excellent military road, completed to this point in 1854, and for the continuation of which W. to Bridger's Pass, on the boundary between Nebraska and Utah, an appropriation of $100,000 was made by congress in 1855. The fort has accommodations for a large force of cavalry, and stone barracks for 8 infantry companies, and being situated in the midst of a fertile country, abounding in timber, forage, and water, has all the advantages requisite for an important frontier post. There is a Methodist mission in the neighborhood.

FORT ROYAL, a seaport of the French West Indies, and capital of Martinique, situated on a deep and well sheltered bay on the W. side of the island; pop. 11,300. It is defended by a fort which commands both the town and the harbor, is the residence of the French governor, and contains, beside the parish church and government offices, a prison, hospital, barracks, and an arsenal. In 1839 it was almost wholly destroyed by an earthquake, in which over 500 lives were lost.

FORT ST. DAVID, a town on the Coromandel coast, presidency of Madras, Hindostan. It stands near the mouth of the river Tripapolore, 12 m. S. S. W. of Pondicherry, and was formerly well fortified. A British factory was established here in 1691. It withstood a siege by the French in 1746, and from that period remained for 12 years the capital of the British possessions in this part of India. In 1758 the French under Lally besieged it again, captured

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it after a short resistance, and destroyed its fortifications.

FORT WAYNE, a flourishing city, capital of Allen co., Ind., situated in a rich, beautiful, and well cultivated region at the confluence of the St. Mary's and St. Joseph's rivers, which here form the Maumee; pop. in 1859, about 15,000. It occupies the site of the old "Twightwee village" of the Miami Indians. A fort was erected here by order of Gen. Wayne in 1794; it was abandoned in 1819, and in 1841 the Indians were removed W. of the Mississippi river. The town has grown up with great rapidity, and is now one of the most important places in the state. It is the point of intersection of 2 railroads, one running from Toledo on Lake Erie to the state line in Illinois, and the other from Pittsburg, Penn., to Chicago. The Wabash and Erie canal passes by it, and numerous plank roads open an easy communication with various towns of Indiana and adjacent states. It has an active trade, is the see of a Roman Catholic bishop, and contains a Methodist female college, a German Roman Catholic school for young ladies under the charge of the sisters of Providence, 2 daily and 4 weekly newspapers, and 15 churches.

FORTE, in music, an Italian word signifying strong, loud. It is the oposite of *piano*, soft, and implies that the passage to which it is affixed is to be executed loudly or forcibly.

FORTESCUE, Sir John, an English lawyer, who lived in the reigns of Henry VI. and Edward IV. The dates of his birth and death are uncertain. In 1426 he was appointed one of the governors of Lincoln's Inn, and in 1442 chief justice of the king's bench. He was a zealous Lancastrian, and when in 1461 the fortune of war made Henry VI. a fugitive, Fortescue accompanied him to Scotland, where Henry is supposed to have appointed him chancellor of England, by which title he has been mentioned by several writers. Soon after, the Yorkists, who at that period controlled the parliament, included him in the act of attainder which was passed by them against the king, queen, and other prominent Lancastrians. In 1463 he fled to the continent with Queen Margaret and her son Edward, and remained abroad several years attending on the royal exiles. He returned with them to England, but after the fatal fight at Tewkesbury in 1471, he became a prisoner to the victor, Edward IV. Having obtained his pardon and liberty, Fortescue withdrew to Gloucestershire, and there passed the residue of his days in retirement. The most celebrated of his works is his treatise *De Laudibus Legum Angliæ*, which is written in the form of a dialogue, the interlocutors being Prince Edward and the author. The earliest edition is that of Whitechurch, published in the beginning of the reign of Henry VIII., and the latest that of A. Amos (Cambridge, 1825). The oldest translation is that by Mulcaster (London, 1516).

FORTH, a large river of Scotland, the 3d of that country in size, and one of the most noted for romantic scenery. It rises from the confluence of two small streams, the Duchray and the Dhu, which unite on the N. E. slope of Ben Lomond. Thence, under the name of the Avendow or Black river, it flows E. through the fertile valley of the Laggan, shut in on either side by hills, and after receiving one or two tributaries assumes the name of Forth. From this point it begins to present the remarkable irregularities which form its chief characteristic, now winding gracefully through a rich level country, now doubling and flowing W., again sweeping to the E., describing at times almost complete circles, and forming all along its course many beautiful peninsulas. The most singular of these windings, called the "links of Forth," occur between Alloa and Stirling, the distance between which places, in a straight line, is about 6 m., while by water it is 12 m. The general course of the river is E. or S. E. Its depth is from 3 to more than 37 fathoms, and its bottom is generally muddy. The tide sets up from the sea as far as Stirling bridge, a distance of 70 m. It is navigable thus far for vessels of 100 tons, and to Alloa for vessels of 300 tons. Its length, including all its sinuosities, cannot be much less than 170 m., though in a direct line it would probably not exceed 90 m. The Teith, Allan, and Devon are its largest tributaries. A canal 38 m. in length connects it with the Clyde. At Kincardine it begins to widen into an estuary, called the frith of Forth, between the counties of Clackmannan and Fife on the N., and of Linlithgow, Edinburgh, and Haddington on the S. The frith contains several islands, and a great abundance of herrings and other fish. Length, 50 m.; greatest breadth, 15 m.

FORTIFICATION. This subject is sometimes divided into defensive fortification, which provides the means of rendering a given locality, permanently or for a short time only, capable of defence; and offensive fortification, which contains the rules for conducting a siege. We shall, however, treat of it here under the three heads of Permanent Fortification, or the mode of putting a locality, in time of peace, in such a state of defence as to compel the enemy to attack it by a regular siege; the art of Sieges; and Field Fortification, or the construction of temporary works to strengthen a given point in consequence of the momentary importance which it may acquire under the peculiar circumstances of a campaign. I. Permanent Fortification. The oldest form of fortification appears to be the stockade, which up to the end of the 18th century was still the national system with the Turks (*palanka*), and is even now in full use in the Indo-Chinese peninsula among the Burmese. It consists of a double or triple row of stout trees, planted upright and near each other in the ground, forming a wall all around the town or camp to be defended. Darius in his expedition among the Scythians, Cortes at Tabasco in Mexico, and Capt. Cook in New Zealand, all came in contact with such stockades. Sometimes the space between the

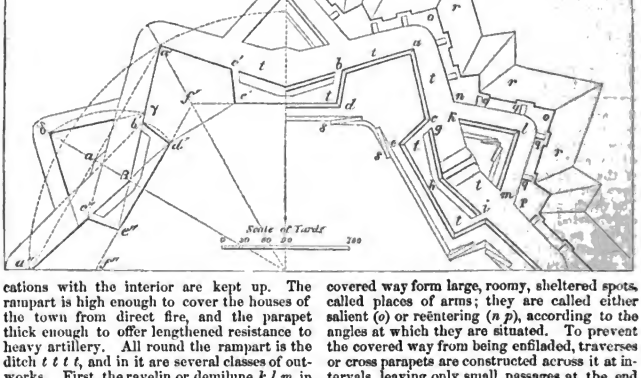
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rows of trees was filled up with earth; in other instances the trees were connected and held together by wicker work. The next step was the erection of masonry walls instead of stockades. This plan secured greater durability, at the same time that it rendered the assault far more difficult; and from the days of Nineveh and Babylon down to the close of the middle ages, masonry walls formed the exclusive means of fortification among all the more civilized nations. The walls were made so high that escalade was rendered difficult; they were made thick enough to offer a lengthened resistance to the battering ram, and to allow the defenders to move about freely on the top, sheltered by a thinner masonry parapet with battlements, through the embrasures of which arrows and other missiles might be shot or thrown against the assailants. To increase the defence, the parapet was soon built overhanging, with holes between the projecting stones on which it rested, so as to allow the besieged to see the foot of the wall and reach an enemy who might have got so far by direct missiles from above. The ditch, no doubt, was also introduced at an early period, surrounding the whole wall, and serving as the chief obstacle against access to it. Finally, the defensive capabilities of masonry walls were developed to the highest point by adding at intervals towers which projected from the wall, thus giving it a flanking defence by missiles thrown from them at such troops as assailed the space between two towers. Being in most cases higher than the wall, and separated from its top by cross parapets, they commanded it and formed each a small fortress, which had to be taken singly after the defenders had been driven from the main wall itself. If we add to this, that in some cities, especially in Greece, there was a kind of citadel, on some commanding height inside the walls (acropolis), forming a redult and second line of defence, we shall have indicated the most essential points of the fortification of the masonry epoch.—But from the 14th to the end of the 16th century the introduction of artillery fundamentally changed the modes of attacking fortified places. From this period dates that immense literature on fortification which has produced systems and methods innumerable, part of which have found a more or less extensive practical application, while others, and not always the least ingenious, have been passed over as merely theoretical curiosities, until at later periods the fruitful ideas contained in them have been again drawn into daylight by more fortunate successors. This has been the fate, as we shall see, of the very author who forms, if we may say so, the bridge between the old masonry system and the new system of earthworks merely revetted with masonry in those places which the enemy cannot see from a distance. The first effect of the introduction of artillery was an increase in the thickness of the walls and in the diameter of the towers at the expense of their height. These towers were now called roundels (*rondelli*), and were made large enough to hold several pieces of cannon. To enable the besieged to work cannon on the wall too, a rampart of earth was thrown up behind it so as to give it the necessary width. We shall soon see how this earthwork gradually encroached on the wall, so as in some cases to supersede it altogether. Albert Dürer, the celebrated German painter developed this system of roundels to its highest perfection. He made them perfectly independent forts, intersecting the continuity of the wall at certain intervals, and with casemated batteries enfilading the ditch; of his masonry parapets, not more than 3 feet high is uncovered (visible to the besieger and subject to his direct fire); and in order to complete the defence of the ditch, he proposed *caponnières*, casemated works on the sole of the ditch, hidden from the eyes of the besiegers, with embrasures on either side so as to enfilade the ditch as far as the next angle of the polygon. Almost all these proposals were new inventions; and if none except the casemates found favor with his age, we shall see that in the latest and most important systems of fortification they have all been adopted and developed according to the altered circumstances of modern times.—About the same time, a change was adopted in the shape of the enlarged towers, from which modern systems of fortification may be considered to date. The round shape had the disadvantage that neither the curtain (the piece of wall between two towers) nor the next adjoining towers could reach with their fire every point in front of an intermediate tower; there were small angles close to the wall, where the enemy, if he once reached them, could not be touched by the fire of the fortress. To avoid this, the tower was changed into an irregular pentagon, with one side turned toward the interior of the fortress, and 4 toward the open country. This pentagon was called a bastion. To prevent repetitions and obscurity, we shall now at once proceed to give the description and nomenclature of bastionary defence, based on one of those systems which show all its essential particulars. Fig. 1 (see next page) represents 3 fronts of a hexagon fortified according to Vauban's first system. The left side represents the mere outline as used in the geometrical delineation of the work; the right gives the ramparts, glacis, &c., in detail. The entire side of the polygon $f' f''$ is not formed by a continuous rampart; at each end, the portions $d' f'$ and $e'' f''$ are left open, and the space thus arising is closed by the projecting pentagonal bastion $d' b' a' c' e'$. The lines $a' b'$ and $a' c'$ form the faces, the lines $b' d'$ and $c' e'$ the flanks of the bastion. The points where faces and flanks meet are called the shoulder points. The line $a' f'$, which goes from the centre of the circle to the point of the bastion, is called the capital. The line $e'' d'$, forming part of the original circumference of the hexagon, is the curtain. Thus every polygon will

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have as many bastions as sides. The bastion may be either full, if the whole pentagon is filled up with earth as high as the *terreplein* of the rampart (the place where the guns stand), or hollow (empty) if the rampart slopes down, immediately behind the guns, into the interior. In fig. 1, *d b a c e* is a full bastion; the next one to the right, of which one half only is seen, is a hollow one. Bastions and curtains together constitute the enceinte, or body of the place. In them we notice, on the terreplein, first the parapet, constructed in front so as to shelter the defenders, and then the ramps, on the interior slope (*s s*), by which the communi-

FIG. 1.

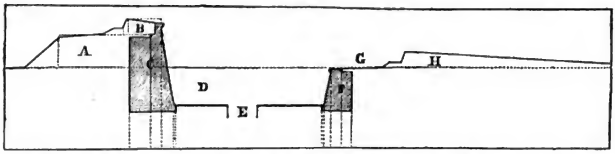


cations with the interior are kept up. The rampart is high enough to cover the houses of the town from direct fire, and the parapet thick enough to offer lengthened resistance to heavy artillery. All round the rampart is the ditch *t t t t*, and in it are several classes of outworks. First, the ravelin or demilune *k l m*, in front of the curtain, a triangular work with two faces, *k l* and *l m*, each with a rampart and parapet to receive artillery. The open rear of any work is called the gorge; thus in the ravelin, *k m*, in the bastion *d e*, is the gorge. The parapet of the ravelin is about 3 or 4 feet longer than the parapet of the body of the place, so that it is commanded by it, and the guns of the latter may in case of need fire away over it. Between the curtain and ravelin there is a long and narrow detached work in the ditch, the *tenaille*, *g h i*, destined principally to cover the curtains from breaching fire; it is low and too narrow for artillery, and its parapet merely serves for infantry to flank the ditch fire into the lunette in case of a successful assault. Beyond the ditch is the covered way, *n o p*, bounded on the inner side by the ditch and on the outer side by the interior slope of the glacis, *r r r*, which from its highest inner boundary line or crest (*crête*) slopes very gradually down into the field. The crest of the glacis is again 3 feet or more lower than the ravelin, so as to allow all the guns of the fortress to fire over it. Of the slopes in these earthworks the exterior one of the body of the place and of the outworks in the ditch (scarp), and the exterior one of the ditch (from the covered way downward) or counterscarp, are generally revetted with masonry. The salient and reëntering angles of the covered way form large, roomy, sheltered spots, called places of arms; they are called either salient (*o*) or reëntering (*n p*), according to the angles at which they are situated. To prevent the covered way from being enfiladed, traverses or cross parapets are constructed across it at intervals, leaving only small passages at the end nearest the glacis. Sometimes there is a small work constructed to cover the communication across the ditch from the tenaille to the ravelin; it is called a *caponnière*, and consists of a narrow pathway covered on either side by a parapet, the exterior surfaces of which slope down gradually like a glacis. There is such a caponnière between the tenaille *g h i* and the ravelin *k l m*, fig. 1.—The section given in fig. 2 will assist in rendering this description clearer. A is the terreplein of the body of the place, B is the parapet, C the masonry revetment of the scarp, D the ditch, E the *cunette*, a smaller and deeper ditch drawn across the middle of the larger one, F the masonry revetment of the counterscarp, G the covered way, H the glacis. The steps shown behind the parapet and glacis are called banquettes, and serve as stands for infantry to step on and fire over the protecting parapet. It will be readily observed from the diagram that the guns placed on the flanks of the bastions sweep the whole ditch in front of the adjoining bastions. Thus the face *a' b'* is covered by the fire of the flank *c'' c''*, and the face *a' c'* by the flank *b d*. On the other hand, the inner faces of two adjoining bastions cover the faces of the ravelin between them, by keeping the ditch in front of the ravelin under their fire. Thus there is no portion of the ditch unprotected by a flanking fire; in this consists the original and great step

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in advance by which the bastionary system inaugurates a new epoch in the history of fortification.—The inventor of bastions is not known, nor is the precise date at which they were introduced; the only thing certain is that they were invented in Italy, and that San Michele in 1527 constructed two bastions in the rampart of Verona. All statements respecting earlier bastions are doubtful. The systems of bastionary fortification are classed under several national schools; the first to be mentioned is of course that which invented bastions, the Italian. The first Italian bastions bore the stamp of their origin; they were nothing but polygonal towers or roundels; they scarcely altered the former character of the fortification, except as regarded the flanking fire. The enceinte remained a masonry wall, exposed to the direct fire of the enemy; the rampart of earth thrown up behind served chiefly to give room to place and handle artillery, and its inner slope was also revetted with masonry, as in the old town walls.

Fig. 2.



It was not till a later day that the parapet was constructed of earthworks, but even then the whole of its outer slope up to the top was revetted with masonry exposed to the direct fire of the enemy. The curtains were very long, from 300 to 550 yards. The bastions were very small, the size of large roundels, the flanks always perpendicular to the curtains. Now as it is a rule in fortification that the best flanking fire always comes from a line perpendicular to the line to be flanked, it is evident that the chief object of the old Italian flank was to cover, not the short and distant face of the adjoining bastion, but the long straight line of the curtain. Where the curtain became too long, a flat, obtuse-angled bastion was constructed on the middle of it, and called a platform (*piata forma*). The flanks were not constructed on the shoulder point, but a little retired behind the rampart of the faces, so that the shoulder points projected and were supposed to shelter them; and each flank had two batteries, a lower one, and a higher one a little to the rear; sometimes even a casemate in the scarp wall of the flank on the bottom of the ditch. Add to this a ditch, and you have the whole of the original Italian system; there were no ravelins, no tenailles, no covered way, no glacis. But this system was soon improved. The curtains were shortened, the bastions were enlarged. The length of the inner side of the polygon (*f f'*, fig. 1) was fixed at from 250 to 300 yards. The flanks were made longer, $\frac{1}{3}$ of the side of the polygon, $\frac{1}{4}$ of the length of the curtain. Thus, though they remained perpendicular to the curtain and had other defects, as we shall see, they now began to give more protection to the face of the next bastion. The bastions were made full, and in their centre a cavalier was often erected, that is, a work with faces and flanks parallel to those of the bastion, but with a rampart and parapet so much higher as to admit of its firing over the parapet of the bastion. The ditch was very wide and deep, the counterscarp running generally parallel to the face of the bastion; but as this direction of the counterscarp prevented the part of the flank nearest the shoulder from seeing and flanking the whole of the ditch, it was subsequently done away with, and the counterscarp was traced so that its prolongation passed through the shoulder point of the next bastion. The covered way was then introduced (first in the citadel of Milan, in the 2d quarter of the 16th century, first described by Tartaglia in 1554). It served as a place of concentration as well as of retreat for sallying parties, and from its introduction the scientific and energetic use of offensive movements in the defence of fortresses may be said to date; to increase its utility the places of arms were introduced, which give more room, and of which the reëntering angles also give a capital flanking fire to the covered way. To render the access to the covered way still more difficult, rows of palisades were erected on the glacis, one or two yards from its crest, but in this position they were soon destroyed by the enemy's fire; after the middle of the 17th century, therefore, they were placed, at the suggestion of the Frenchman Maudin, on the covered way, covered by the glacis. The gates were in the middle of the curtain; to cover them, a crescent-shaped work was placed in the middle of the ditch in front of them; but for the same reason that the towers were transformed into bastions, the half-moon (*demi-lune*) was soon changed into a triangular work—the present ravelin. This was still very small, but became larger when it was found that not only did it serve as a bridge-head across the ditch, but also covered flanks and curtains against the enemy's fire, gave a cross fire in front of the capitals of the bastions, and effectually flanked the covered way. Still they were made very small, so that the prolongation of their faces reached the body of the place in the curtain point (the extremity of the curtain). The principal faults of the Italian

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mode of fortification were the following: 1. The bad direction of the flank. After the introduction of ravelins and covered ways, the curtain became less and less the point of attack; the faces of the bastions now were chiefly assailed. To cover these well, the prolongation of the faces should have met the curtain at the very point where the flank of the next bastion was erected, and this flank should have been perpendicular or nearly so to this prolonged line (called the line of defence). In that case there would have been an effective flanking fire all along the ditch and front of the bastion. As it was, the line of defence was neither perpendicular to the flanks nor did it join the curtain at the curtain point; it intersected the curtain at $\frac{1}{3}$, $\frac{1}{4}$, or $\frac{1}{5}$ of its length. Thus, the direct fire of the flank was more likely to injure the garrison of the opposite flank than the assailants of the next bastion. 2. There was an evident want of provision for a prolonged defence after the enceinte had been breached and successfully assaulted at one single point. 3. The small ravelins but imperfectly covered the curtains and flanks, and received but a poor flanking fire from them. 4. The great elevation of the rampart, which was all faced or revetted with masonry, exposed, in most cases, a height of 15 to 20 feet of masonry to the direct fire of the enemy, and of course this masonry was soon destroyed. We shall find that it took almost two centuries to eradicate this prejudice in favor of uncovered masonry, even after the Netherlands had proved its uselessness. The best engineers and authors belonging to the Italian school were: San Michele (died 1559), fortified Napoli di Romania in Greece, and Candia, and built Fort Lido near Venice; Tartaglia (about 1550); Alghisi da Carpi, Girolamo Maggi, and Giacomo Castriotto, who about the end of the 16th century all wrote on fortification. Paciotto of Urbino built the citadels of Turin and Antwerp (1560–'70). The later Italian authors on fortification, Marchi, Busca, Floriani, Rosetti, introduced many improvements, but none of these were original. They were mere plagiarists of more or less skill; they copied most of their devices from the German Daniel Speckle, and the remainder from the Netherlanders. They all belong to the 17th century, and were completely eclipsed by the rapid development of fortificatory science which at that time took place in Germany, the Netherlands, and France.—The defects of the Italian system of fortification were soon discovered in Germany. The first man to point out the chief defect of the elder Italian school, the small bastions and long curtains, was a German engineer, Franz, who fortified for Charles V. the town of Antwerp. In the council held to try the plan, he insisted upon larger bastions and shorter curtains, but was outvoted by the duke of Alva and the other Spanish generals, who believed in nothing but the routine of the old Italian system. Other German fortresses were distinguished by the adoption of casemated galleries upon the principle of Dürer, as Küstrin, fortified in 1537–'58, and Jülich, fortified a few years later by an engineer known under the name of Master John (*Meister Johann*). But the man who first broke completely through the fetters of the Italian school and laid down the principles on which the whole of the subsequent systems of bastionary fortification are founded, was Daniel Speckle, engineer to the town of Strasbourg (died 1589). His chief principles were: 1. That a fortress becomes stronger the more sides there are to the polygon which forms the enceinte, the different fronts being thereby enabled to give a better support to each other; consequently, the nearer the outline to be defended comes to a straight line, the better. This principle, demonstrated as an original discovery with a great show of mathematical learning by Cormontaigne, was thus very well known to Speckle 150 years earlier. 2. Acute-angled bastions are bad; so are obtuse-angled; the salient angle should be a right one. Though correct in his opposition to acute salients (the smallest admissible salient angle is now generally fixed at 60°), the partiality of his time for right-angled salients made him hostile to the obtuse salient, which is indeed very advantageous and unavoidable in polygons with many sides. In fact, this appears to have been merely a concession to the prejudices of his time, for the diagrams of what he considers his strongest method of fortification all have obtuse-angled bastions. 3. The Italian bastions are far too small; a bastion must be large. Consequently, Speckle's bastions are larger than those of Cormontaigne. 4. Cavaliers are necessary in every bastion and on every curtain. This was a consequence of the system of siege of his time, in which high cavaliers in the trenches played a great part. But in Speckle's intention, the cavaliers were to do more than resist these; they are real *coupures* provided beforehand in the bastion, forming a second line of defence after the enceinte has been breached and stormed. The whole of the credit generally given to Vauban and Cormontaigne for cavaliers forming permanent coupures, is therefore in reality due to Speckle. 5. A portion, at least, of the flank, and better still the whole of the flank of a bastion, must be perpendicular to the line of defence, and the flank be erected in the point where the line of defence crosses the curtain. This important principle, the alleged discovery of which forms the greater part of the glory of the French engineer Pagan, was thus publicly proclaimed 70 years before Pagan. 6. Casemated galleries are necessary for the defence of the ditch; consequently Speckle has them both on the faces and flanks of the bastion, but only for infantry; if he had made them large enough for artillery, he would in this respect have been fully up to the latest improvements. 7. To be useful, the ravelin must be as large as possible; accordingly, Speckle's ravelin is the largest ever proposed. Now, Vauban's improvements upon Pagan consist partly, and Cormontaigne's improvements upon

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Vauban consist almost entirely, in the successive enlargement of the ravelin; but Speckle's ravelin is a good deal larger than even Cormontaigne's. 8. The covered way is to be strengthened as much as possible. Speckle was the first to see the immense importance of the covered way, and he strengthened it accordingly. The crests of the glacis and of the counterscarp were formed *en crémaillère* (like the edge of a saw), so as to render enfilading fire ineffective. Cormontaigne, again, took up this idea of Speckle's; but he retained the traverses (short ramparts across the covered way against enfilading fire), which Speckle rejected. Modern engineers have generally come to the conclusion that Speckle's plan is better than Cormontaigne's. Speckle, beside, was the first to place artillery on the places of arms of the covered way. 9. No piece of masonry is to be exposed to the eye and direct fire of the enemy, so that his breaching batteries cannot be established before he has arrived on the crest of the glacis. This most important principle, though established by Speckle in the 16th century, was not generally adopted until Cormontaigne; even Vauban exposes a good deal of his masonry. (See C, fig. 2.) In this short abstract of Speckle's ideas the fundamental principles of all modern bastionary fortification are not only contained but plainly stated, and his system, which even now would afford very good defensive works, is truly wonderful considering the time in which he lived. There is not a celebrated engineer in the whole history of modern fortification who cannot be proved to have copied some of his best ideas from this great original source of bastionary defence. Speckle's practical engineering skill was shown in the construction of the fortresses of Ingolstadt, Schlettstadt, Hagenau, Ulm, Colmar, Basel, and Strasbourg, all of which were fortified under his direction.—About the same epoch, the struggle for the independence of the Netherlands gave rise to another school of fortification. The Dutch towns, whose old masonry walls could not be expected to resist a regular attack, had to be fortified against the Spaniards; there was, however, neither time nor money for the erection of the high masonry bastions and cavaliers of the Italian system. But the nature of the ground offered other resources in its low elevation above the water horizon, and consequently the Dutch, expert in canal and dike building, trusted to the water for their defence. Their system was the exact counterpart of the Italian: wide and shallow wet ditches, from 14 to 40 yards across; low ramparts without any masonry revetment, but covered by a still lower advanced rampart (*fausse-braie*) for the stronger defence of the ditch; numerous outworks in the ditch, such as ravelins, half moons (ravelins in front of the salient of the bastion), horn and crown works;* and finally, a better use of the accidents of the ground than with the Italians. The first town fortified entirely by earthworks and wet ditches was Breda (1533). Subsequently the Dutch method received several improvements: a narrow zone of the scarp was revetted with masonry, as the wet ditches, when frozen over in winter, were easily passed by the enemy; locks and sluices were constructed in the ditch, so as to let the water in at the moment when the enemy had begun to sap the hitherto dry bottom; and finally, sluices and dikes were constructed for a systematic inundation of the country around the foot of the glacis. The writers on this elder Dutch method of fortification are Marolois (1627), Freitag (1630), Völker (1666), Melder (1670). An application of Speckle's maxims to the Dutch method was attempted by Scheither, Neubauer, Heidemann, and Heer (all from 1670 to 1690, and all of them Germans).—Of all the different schools of fortification, the French has enjoyed the greatest popularity; its maxims have found practical application in a greater number of still existing fortresses than those of all the other schools put together. Still, there is no school so poor in original ideas. There is neither a new work nor a new principle in the whole of the French school which is not borrowed from the Italians, the Dutch, or the Germans. But the great merit of the French is the reduction of the art to precise mathematical rules, the symmetrical arrangement of the proportions of the different lines, and the adaptation of the scientific theory to the varied conditions given by the locality to be fortified. Errard of Barle-Duc (1594), commonly called the father of French fortification, has no claim to the appellation; his flanks form an acute angle with the curtain, so as to be still more ineffective than those of the Italians. A more important name is Pagan (1645). He was the first to introduce in France, and to popularize, Speckle's principle that the flanks should be perpendicular to the lines of defence. His bastions are roomy; the proportions between the lengths of faces, flanks, and curtains are very good; the lines of defence are never longer than 240 yards, so that the whole of the ditch, but not the covered way, is within musket range from the flanks. His ravelin is larger than that of the Italians, and has a *reduit* or keep in its gorge, so as to admit of resistance when its rampart has already been taken. He covers the faces of the bastions with a narrow detached work in the ditch, called a counter-guard, a work which had already been used by the Dutch (the German Dillich appears to have first introduced it). His bastions have a double rampart on the faces, the second to

* A horn work is a bastionary front, two half bastions, a curtain, and a ravelin advanced in front of the main ditch and closed on each side by a straight line of rampart and ditch, which is aligned upon the faces of the bastions of the enceinte so as to be completely flanked by their fire. A crown work consists of two such advanced fronts (one bastion flanked by two half bastions); a double crown work has three fronts. In all these works it is necessary that their rampart should be at least as much lower than that of the enceinte as the rampart of the ravelin to maintain the command of the enceinte over them. The adoption of such outworks, which of course were exceptions, was regulated by the nature of the ground.

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serve as a coupure; but the ditch between the two ramparts is entirely without flanking fire. The man who made the French school the first in Europe was Vauban (1633–1707), marshal of France. Although his real military glory rests upon his two great inventions in the attack of fortresses (ricochet fire and parallels), still he is popularly better known as a constructor of them. What we have said of the French school is true of Vauban's method in the highest degree. We see in his constructions as great a variety of forms as is compatible with the bastionary system; but there is nothing original among them, much less any attempt to adopt other forms than the bastionary. But the arrangement of the details, the proportions of the lines, the profiles, and the adaptation of the theory to the ever-varying requirements of the locality, are so ingenious, that they appear perfection in comparison to the works of his predecessors, so that scientific and systematic fortification may be said to date from him. Vauban, however, did not write a line on his method of fortification, but from the great number of fortresses constructed by him the French engineers have tried to deduce the theoretical rules he followed, and thus have been established 3 methods, called Vauban's first, second, and third system. Fig. 1 gives the first system in its greatest simplicity. The chief dimensions were: the outer side of the polygon, from the point of one bastion to that of the next, 800 yards (on an average); on the middle of this line, a perpendicular $a\ \beta$, $\frac{1}{8}$ of the first; through β, the lines of defence from a'' and a', $a''\ d'$, and $a'\ e'$. From the points a'' and a', $\frac{2}{3}$ of $a''\ a'$ measured on the lines of defence gives the faces $a''\ c''$ and $a'\ b'$. From the shoulder points c'' and b' arcs with the radius $c''\ d'$ or $b'\ e''$ were drawn between the lines of defence, giving the flanks $b'\ d'$ and $c''\ e''$. Draw $e''\ d'$, the curtain. The ditch: with radius 30 yards, an arc in front of the point of the bastion, prolonged by tangents drawn to this arc from the shoulder points of the adjoining bastions, gives the counterscarp. The ravelin: from the curtain point e'', with radius $e''\ \gamma$ (γ, a point on the opposite face 11 yards beyond the shoulder-point), draw the arc $\gamma\ \delta$, until it crosses the prolongation of the perpendicular $a\ \beta$; this gives the point of the ravelin; the chord to the arc just described gives the face, which is continued from the point until it reaches the prolongation of the tangent forming the counterscarp of the main ditch; the gorge of the ravelin is fixed by this line equally, so that the whole of the ditch remains free for the fire of the flanks. In front of the curtain, and there alone, Vauban retained the Dutch *fausse-braie;* this had already been done by the Italian Floriani before him, and the new work had been called *tenaille* (*tenaglia*). Its faces were in the direction of the lines of defence. The ditch in front of the ravelin was 24 yards wide, the counterscarp parallel to the faces of the ravelin, and the point rounded off. In this manner Vauban obtained roomy bastions, and kept his flanked salient angles well within musket range; but the simplicity of these bastions renders the defence of the place impossible as soon as the face of one bastion is breached. His flanks are not so good as Speckle's or Pagan's, forming an acute angle with the lines of defence; but he does away with the 2 and 3 tiers of uncovered guns which figure in most of the Italian and early French flanks, and which were never very useful. The tenaille is intended to strengthen the defence of the ditch by infantry fire, and to cover the curtain from direct breaching fire from the crest of the glacis; but this is very imperfectly done, as the breaching batteries in the reëntering place of arms (*n*, fig. 1) have a full view of the piece of the curtain next to the flank at *e*. This is a great weakness, as a breach there would turn all the coupures prepared in the bastion as a second line of defence. It arises from the ravelin being still too small. The covered way, constructed without crémaillères, but with traverses, is much inferior to Speckle's; the traverses prevent not only the enemy, but also the defence, from enfilading the covered way. The communications between the different works are on the whole good, but still not sufficient for energetic sallies. The profiles are of a degree of strength which is still generally adopted. But Vauban still clung to the system of revetting the whole of the outside of the rampart with masonry, so that at least 15 feet high of masonry was uncovered. This mistake is made in many of Vauban's fortresses, and once made can only be remedied at an enormous expense by widening the ditch in front of the faces of the bastions, and constructing earthwork counterguards to cover the masonry. During the greater part of his life Vauban followed his first method; but after 1680 he introduced two other methods, having for their object to admit of a prolonged defence after the bastion was breached. For this purpose he took up an idea of Castriotto's, who had proposed to modernize the old tower and wall fortification by placing detached bastions, isolated, in the ditch, in front of the towers. Both Vauban's second and third methods agree in this. The ravelin is also made larger, the masonry is a little better covered; the towers are casemated, but badly; the fault that the curtain may be breached between bastion and tenaille is maintained, and renders the detached bastion partly illusory. Still, Vauban considered his second and third methods as very strong. When he handed over to Louis XIV. the plan for the fortification of Landau (second system), he said: "Sire, here is a place that all my art would not suffice to take." This did not prevent Landau from being taken 3 times during Vauban's life (1702, 1703, 1704), and again shortly after his death (1713).—The errors of Vauban were rectified by Cormontaigne, whose method may be considered as the perfection of the bastionary system. Cormontaigne (1696–1752) was a general of engineers. His larger bastions

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permit the construction of permanent coupures and second lines of defence; his ravelins were nearly as large as those of Speckle, and fully covered that portion of the curtain which Vauban had left exposed. In polygons of 8 and more sides his ravelins were so far advanced that their fire took in the rear the besiegers' works against the next bastion as soon as he reached the crest of the glacis. In order to avoid this, two ravelins have to be conquered before one bastion can be breached. This mutual support of the large ravelins becomes more and more effective the more the line to be defended approaches a straight one. The reëntering place of arms was strengthened by a redult. The crest of the glacis is drawn *en crémaillère*, as with Speckle, but traverses are maintained. The profiles are very good, and the masonry is always covered by the earthworks in front. With Cormontaigne the French school closes, as far as the construction of bastionary defences, with outworks within the ditch, is concerned. A comparison of the gradual development of bastionary fortification from 1600 to 1750, and of its final results as laid down by Cormontaigne, with the principles of Speckle, as stated above, will tend to elucidate the wonderful genius of the German engineer; for although outworks in the ditch have been multiplied to an enormous degree, yet not a single important principle has been discovered during all these 150 years which had not been already clearly and distinctly enunciated by Speckle. —After Cormontaigne, the school of engineers of Mézières (abont 1760) made some slight alterations in his system, the principal of which is the return to Speckle's old rule that the flanks must be perpendicular to the lines of defence. But the principal point for which the school of Mézières is remarkable is that they for the first time constrnct ontworks beyond the covered way. On fronts particularly open to attack they place at the foot of the glacis, on the capital of the bastion, a detached ravelin called a lunette, and thereby approach for the first time to the modern system of permanent intrenched camps. In the beginning of the 19th century Bousmard, a French emigrant who served in Prussia and was killed at Dantzic in 1806, tried still to improve upon Cormontaigne; his ideas are rather complicated, and the most remarkable is that his ravelin, which is very large, is advanced to the foot of the glacis almost so as to take the place and functions, to a certain degree, of the lunette just described.—A Dutch engineer of Vauban's time, who more than once opposed him in siege warfare with equal honor, Baron Coehorn, gave a further development to the old Dutch method of fortification. His system gives a stronger defence even than Cormontaigne's, by the clever combination of wet and dry ditches, the great facilities offered to sorties, the excellent communications between the works, and the ingenious redults and coupures in his ravelins and bastions. Coehorn, a great admirer of Speckle, is the only engineer of note who was honest enough to acknowledge how much he owed to him.—We have seen that even before the introduction of bastions, Albert Dürer used caponnières to afford a stronger flanking fire. In his fortified square he even entirely trusts to these caponnières for the defence of the ditch; there are no towers on the corner of the fort; it is a plain square with none but salient angles. To make the enceinte of a polygon entirely coincident with its outline, so as to have all salient and no reëntering angles, and to flank the ditch by caponnières, constitutes what is called polygonal fortification, and Dürer must be considered as its father. On the other hand, a star-shaped enceinte, in which salient and reëntering angles follow upon each other regularly, and in which each line is both flank and face at once, flanking the ditch of the next line with the portion next to the reëntering angle, and commanding the field with the portion next the salient—such an outline constitutes tenaille fortification. The older Italians and several of the older Germans had proposed this form, but it was not developed till afterward. The system of George Rimpler (engineer to the emperor of Germany, killed in defending Vienna against the Turks in 1683) forms a kind of intermediate stage between the bastionary and tenaille system. What he calls intermediate bastions constitute in reality a perfect line of tenailles. He declared himself energetically against open batteries with a mere earth parapet in front, and insisted on casemated batteries wherever they could be erected; especially on the flanks, where 2 or 3 tiers of well covered guns would thus have a far greater effect than the 2 or 3 tiers of guns in open flank batteries, which could never act together. He also insisted on batteries, that is, *reduits*, in the places of arms of the covered way, which Coehorn and Cormontaigne adopted, and especially a double and triple line of defence behind the salient angles of the enceinte. In this manner his system is remarkably in advance of his time; the whole of his enceinte consists of independent forts, each of which has to be taken separately, and large defensive casemates are used in a manner which reminds us, almost in the details even of their application, of the more recent constructions in Germany. There is no doubt that Montalembert owed as much to Rimpler as the bastionary system of the 17th and 18th century to Speckle. The author who first fully developed the advantages of the tenaille over the bastionary system was Landsberg (1712); but it would lead us too far if we were to enter into his arguments or describe his fortificatory outline. Of the long series of skilful German engineers who followed Rimpler and Landsberg, we may name the Mecklenburg colonel Buggenhagen (1720), the inventor of blockhouse traverses, or traverses hollowed out and adapted for casemated musketry fire; and the Würtemberg major Herbort (1734), inventor of defensive barracks,

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large barracks in the gorge of salient works, proof against vertical fire, with embrasured casemates on the side facing the enceinte, and barracks and store rooms on the side facing the town. Both these constructions are now very largely used.—Thus we see that the German school, with almost the only exception of Speckle, was from its origin adverse to bastions, which it sought to replace chiefly by tenailles, and that it attempted at the same time to introduce a better system of inner defence, chiefly by the use of casemated galleries, which again were considered as the height of absurdity by French engineering authorities. One of the greatest engineers, however, that France ever produced, the marquis de Montalembert (1713–'99), major-general of cavalry, passed over with drums beating and colors flying into the camp of the German school, to the great horror of the whole French engineering corps, who, up to the present date, decry every word he has written. Montalembert severely criticized the defects of the bastionary system; the ineffectuality of its flanking fire; the almost certainty it offered to the enemy that his shots if they missed one line must do harm in another; the want of protection against vertical fire; the perfect uselessness of the curtain as to fire; the impossibility of having good and large coupures in the gorges of the bastions, proved by the fact that no fortress of his time had any of the multifarious permanent coupures proposed by the theorists of the school; and the weakness, bad connection, and want of mutual support of the outworks. Montalembert therefore preferred either the tenaille or the polygonal system. In either case the body of the place consisted of a row of casemates, with one or two tiers of guns, the masonry of which was covered from direct fire by a counterguard or *couvre-face* of earthwork extending all around and having a second ditch in its front; this ditch was flanked by casemates in the reëntering angles of the couvre-face covered by the parapet of the reduit or lunette in the reëntering place of arms. The whole system was based upon the principle of opposing, by means of casemated guns, such an overwhelming fire to the enemy the moment he reached the crest of the glacis, or of the couvre-face, that he could not possibly succeed in erecting his breaching batteries. That casemates could do this he maintained against the unanimous condemnation of French engineers, and he afterward even compiled systems of circular and tenaille fortifications in which all earthworks were rejected and the whole defence intrusted to high casemated batteries with from 4 to 5 tiers of guns, the masonry of which was to be protected by the fire of its batteries only. Thus, in his circular system, he contrives to concentrate 348 guns on any point 500 yards from the fortress, and expects that such an immense superiority of fire would put the possibility of erecting siege batteries entirely out of the question. In this, however, he has found no adherents, except in the construction of the sea fronts of coast forts; here the impossibility of breaching strong casemated walls by the guns of ships was pretty well demonstrated by the bombardment of Sebastopol. The splendid forts of Sebastopol, Cronstadt, Cherbourg, and the new batteries on the entrance of Portsmouth harbor (England), and almost all modern forts for harbor defence against fleets, are constructed according to Montalembert's principle. The partly uncovered masonry of the Maximilian towers at Lintz (Austria) and of the reduits of the detached forts of Cologne are imitated from Montalembert's less happy projects. In the fortification of steep heights (Ehrenbreitstein in Prussia, for instance) the uncovered masonry forts have also been sometimes adopted, but what resistance they will be able to make must be decided by actual experience.—The tenaille system has never, to our knowledge at least, found practical application, but the polygonal system is in great favor in Germany, and has been applied to most modern constructions there; while the French tenaciously cling to Cormontaigne's bastions. The enceinte, in the polygonal system, is generally a plain earthwork rampart with revetted scarp and counterscarp, with large caponnières in the middle of the fonts, and with large defensive barracks behind the rampart and covered by it to serve as coupures. Similar defensive barracks have also been erected as coupures in many bastionary works, to close the gorges of the bastions; the rampart serving as a counterguard to protect the masonry from distant fire. Of all Montalembert's proposals, however, that of detached forts has had the greatest success, and initiated a new era, not only in fortification, but in the attack and defence of fortresses, and even in general strategy. Montalembert proposed to surround large fortresses in important situations by a single or double chain of small forts, on commanding elevations, which, though isolated in appearance, would still support each other by their fire, and, by the facility they gave for large sorties, would render a bombardment of the place impossible, and when required form an intrenched camp for an army. Vauban had already introduced permanent intrenched camps under the guns of fortresses, but their intrenchments consisted of long continuous lines, which, if broken through at one point only, were completely at the mercy of the enemy. But these intrenched camps of Montalembert's were capable of a far greater resistance, for each fort had to be taken singly, and before 3 or 4 at least were conquered, no enemy could open his trenches against the place. Moreover, the siege of each of the forts could be interrupted at every moment by the garrison, or rather the army encamping behind the forts, and thus a combination of active campaigning and regular fortress warfare was secured, which must greatly strengthen the defence. When Napoleon led his armies hundreds of miles through the enemy's country, never heeding the fortresses which had all been constructed

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according to the old system, and when in return the allies (1814 and 1815) marched straight on toward Paris, leaving almost unnoticed in their rear the triple belt of fortresses with which Vauban had endowed France, it became evident that a system of fortification was antiquated which confined its outworks to the main ditch or at the outside to the foot of the glacis. Such fortresses had lost their power of attraction over the large armies of modern times. Their means of doing harm did not extend beyond the range of their cannon. It thus became necessary to find some new means to break the impetuous movement of modern invading armies, and Montalembert's detached forts were applied on a large scale. Cologne, Coblentz, Mentz, Rastadt, Ulm, Königsberg, Posen, Lintz, Peschiera, and Verona were severally transformed into large intrenched camps, capable of holding from 60,000 to 100,000 men, but defensible, in case of need, by far smaller garrisons. At the same time, the tactical advantages of the locality to be fortified were placed in the background by the strategetical considerations which now decided the situation of fortresses. Such places only were fortified as might directly or indirectly stop the progress of a victorious army, and which, being large towns in themselves, offered great advantages to an army by being the centre of the resources of whole provinces. Situations on large rivers, especially at the points of junction of two considerable rivers, were chosen in preference, as they compelled the attacking army to divide its forces. The enceinte was simplified as much as possible, and outworks in the ditch were almost entirely done away with; it was sufficient to have the enceinte safe against an irregular attack. The principal battle-field lay around the detached forts, and they were to be defended not so much by the fire from their ramparts, as by the sallies of the garrison of the fortress itself. The largest fortress constructed upon this plan is Paris; it has a simple bastioned enceinte with bastioned forts, almost all squares; there is no outwork, not even a ravelin, in the whole fortification. No doubt, the defensive strength of France has gained 30 per cent. by this new and immense intrenched camp, large enough to afford a refuge for three beaten armies. The intrinsic value of the different methods of fortification has lost a great deal of its importance by this improvement; the cheapest will now be the best; for the defence is now based, not upon the passive system of awaiting the enemy behind the walls until he opens his trenches, and then cannonading them, but upon the active one of taking the offensive with the concentrated strength of the garrison against the necessarily divided forces of the besieger. II. Sieges. The art of sieges had been brought to a certain perfection by the Greeks and Romans. They tried to breach the walls of fortresses by the battering ram, and approached them under cover of strongly roofed galleries, or in case of need by a lofty construction which was to command walls and towers by its greater height, and offer a safe approach to the storming columns. The introduction of gunpowder did away with these contrivances; the fortresses having now ramparts of less elevation, but a fire effective at long distances, the approaches were made by trenches, leading in zigzags or curved lines toward the glacis; batteries being erected at various spots so as to silence if possible the fire of the besieged and to batter down his masonry. Once arrived on the crest of the glacis, a high trench cavalier was erected, with the intention of commanding the bastions and their cavaliers, and then by a crushing fire to complete the breach and prepare for the assault. The curtain was the point generally attacked. There was, however, no system in this mode of attack until Vauban introduced parallels of ricochet firing, and regulated the process of sieges in the manner which is in use even now, and still denominated Vauban's attack. The besieger, after investing the place with a sufficient force on all sides, and choosing the fronts to be attacked, opens the first parallel during the night (all siege works are chiefly carried on at night) at about 600 yards from the fortress. A trench parallel to the sides of the besieged polygon is drawn around at least 3 of these sides and fronts; the earth, being thrown up on the side toward the enemy and propped upon the sides of the ditch with gabions (willow-work baskets filled with earth), forms a kind of parapet against the fire of the fortress. In this first parallel the ricochet batteries for enfilading the long lines of the attacked fronts are constructed. Taking for the object of the siege a bastioned hexagon, there should be ricochet batteries to enfilade the faces of 2 bastions and 3 ravelins, in all the batteries, one for each face. These batteries throw their shot so as to pass just over the parapet of the works and along the faces in their whole length, taking them in flank and endangering guns and men. Similar batteries are constructed to enfilade the branches of the covered way, and mortars and howitzers are placed in battery to throw shells into the interior of the bastions and ravelins. All these batteries are covered by earthwork parapets. At the same time, at two or more places, zigzag trenches are pushed forward toward the place, taking care to avoid all enfilading fire from the town; and so soon as the fire of the place shows signs of slacking, the second parallel, about 350 yards from the works, is opened. In this parallel the dismounting batteries are constructed. They serve to completely destroy the artillery and embrasures on the faces of the fortress; there will be 8 faces to attack (2 bastions and their ravelins, and the inner faces of the adjoining ravelins), for each of which there is a battery, constructed parallel to the attacked faces, and each embrasure exactly opposite to an embrasure of the fortress. From the second parallel fresh zigzags are pushed toward the town; at 200 yards the half parallel is constructed, forming new en-

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largements of the zigzags armed with mortar batteries; and at last, at the foot of the glacis, the third parallel. This is armed with heavy mortar batteries. By this time the fire of the place will have been nearly silenced, and the approaches, in varied forms of curved or angular lines, to avoid ricochet fire, are carried up to the crest of the glacis, which it reaches opposite the points of the two bastions and of the ravelin. A lodgment or trench and parapet is then formed in the salient place of arms to enfilade the ditch by infantry fire. If the enemy is active and daring in his sorties, a 4th parallel connecting the salient places of arms across the glacis becomes necessary. Otherwise a sap is pushed from the 3d parallel to the reëntering places of arms, and the crowning of the glacis, or the construction of a trench all along the covered way on the crest of the glacis, is completed. Then the counter batteries are constructed in this *couronnement* in order to silence the fire of the flank, which enfilades the ditch, and after them the breaching batteries against the point and faces of the bastions and ravelin. Opposite the points to be breached, a mining gallery is constructed leading down from the trenches through the glacis and counterscarp into the ditch; the counterscarp is blown in, and a fresh trench constructed across the ditch to the foot of the breach, covered on the side whence the enfilading fire of the flank comes by a parapet. As soon as both breach and passage of the ditch are complete, the assault takes place. This is in the case of a dry ditch; across a wet ditch, a dike has to be constructed with fascines, covered equally by a parapet on the side of the flank of the adjoining bastion. If on taking the bastion it is found that there is a further intrenchment or coupure in the rear, a lodgment has to be effected, fresh batteries to be constructed on the breach, and a fresh breach, descent, and passage of the ditch and assault to be made. The average resistance of a bastioned hexagon of Vauban's first method against such a siege is calculated to be from 19 to 22 days if there are no coupures, and 27 or 28 days if it is provided with coupures. Cormontaigne's method is expected to hold ont 25 or respectively 35 to 37 days. III. Field Fortification. The construction of field works is as old as the existence of armies. The ancients were even far more expert in this art than our modern armies; the Roman legions, before an enemy, intrenched their camp every night. During the 17th and 18th centuries we see also a very great use of field works, and in the wars of Frederic the Great pickets on outpost duty generally threw up slightly profiled redans. Yet even then, and it is still more the case now, the construction of field works was confined to the strengthening of a few positions selected beforehand with a view to certain eventualities during a campaign. Thus Frederic the Great's camp at Bunzelwitz, Wellington's lines at Torres Vedras, the French lines of Weissenburg, and the Austrian intrenchments in front of Verona in 1848. Under such circumstances, field works may exercise an important influence upon the issue of a campaign by enabling an inferior army successfully to resist a superior one. Formerly the intrenched lines, as in Vauban's permanently intrenched camps, were continuous; but from the defect that if pierced and taken at one point the whole line was useless, they are now universally composed of one or more lines of detached redoubts, flanking each other by their fire, and allowing the army to fall upon the enemy through the intervals as soon as the fire of the redoubts has broken the energy of his assault. This is the principal use of field works; but they are also employed singly, as bridge heads to defend the access to a bridge, or to close an important pass to small parties of the enemy. Omitting all the more fanciful shapes of works which are now out of date, such fortifications should consist of works either open or closed at the gorge. The former will either be redans (two parapets with a ditch in front forming an angle facing the enemy) or lunettes (redans with short flanks). The latter may be closed at the gorge by palisadings. The principal closed field work now in use is the square redoubt, either as a regular or an irregular quadrangle, closed by a ditch and parapet all round. The parapet is made as high as in permanent fortification (7 to 8 feet), but not so thick, having to resist field artillery only. As none of these works has a flanking fire in itself, they have to be disposed so that they flank each other within musket range. To do this effectually, and strengthen the whole line, the plan now most generally adopted is to form an intrenched camp by a line of square redoubts flanking each other, and also a line of simple redans, situated in front of the intervals of the redoubts. Such a camp was formed in front of Comorn, south of the Danube, in 1849, and was defended by the Hungarians for 2 days against a far superior army.—The following statement exhibits the fortifications of the United States now existing or in course of construction (Oct. 1859), and the amount expended for their construction, modification, and repair:

	Name or locality of fort.	Amount expended for construction and repair.
	On the Northern Frontier.	
1	Fort Wayne, near Detroit, Mich.	$171,735
2	Fort Porter, near Buffalo, N. Y.	116,500
3	Fort Niagara, Niagara river, N. Y.	68,027
4	Fort Ontario, near Oswego, N. Y.	75,615
5	Fort Montgomery, at outlet of L. Champlain	240,353
	Total on the northern frontier	$730,250
	On the Atlantic and Gulf Coast.	
1	Fort Knox, at narrows of Penobscot river, Me.	881,421
2	Fort at entrance to Kennebec river, Me.	1,000
3	Fort Preble, Portland harbor, Me.	52,811
4	Fort Scammel, Portland harbor	59,826
5	Fort on Hog Island ledge, Portland harbor	84,200
6	Fort McClary, Portsmouth harbor, N. H.	20,500
7	Fort Constitution, Portsmouth harbor	17,891
8	Fort Independence, Boston harbor, Mass.	519,670
9	Fort Winthrop, Boston harbor	130,144
10	Fort Warren, Boston harbor	1,900,000
	Amount carried forward	$3,225,094

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Statement continued.

	Name or locality of fort.	Amount expended for construction and repair.
	Amount brought forward	$8,225,096
11	Forts at New Bedford harbor, Mass	95,000
12	Fort Adams, Newport harbor, R. I	1,691,343
13	Fort Trumbull, New London harbor, Conn.	250,941
14	Fort Griswold, New London harbor	14,700
15	Fort Schuyler, East river, N. Y.	903,013
16	Fort opposite Fort Schuyler, N. Y.	122,927
17	Fort Columbus, Castle William, and South battery, N. Y.	304,467
18	Fort Gibson, Ellis's island, N. Y.	5,096
19	Fort Wood, Bedloe's island, N. Y.	223,000
20	Fort Richmond, Staten island, N. Y.	620,177
21	Fort on site of Fort Tompkins, Staten island	115,000
22	Battery Hudson, Staten island	25,081
23	Battery Morton, Staten island	3,503
24	Fort Lafayette, at the Narrows, N. Y.	351,941
25	Fort Hamilton, at the Narrows	635,752
26	Fort at Sandy Hook, N. J.	100,000
27	Fort Mifflin, near Philadelphia, Penn	82,999
28	Fort Delaware, Pea-patch island, Del. river	1,339,914
29	Fort McHenry, Baltimore harbor, Md.	146,668
30	Fort Carroll, Soilers Point flats, Balt. harbor	706,871
31	Fort Madison, Annapolis harbor, Md.	45,600
32	Fort Severn, Annapolis harbor	6,484
33	Fort Washington, on Potomac river, Md.	575,969
34	Fort Monroe, Hampton roads, Va	2,476,771
35	Fort Calhoun, Hampton roads	1,824,551
36	Fort Macon, Beaufort harbor, N. C.	463,700
37	Fort Caswell, mouth of Cape Fear river	571,221
38	Castle Pinckney, Charleston harbor, S. C.	58,809
39	Fort Moultrie, Charleston harbor	87,001
40	Fort Sumter, Charleston harbor	977,408
41	Fort Pulaski, mouth of Savannah river, Ga.	988,359
42	Fort Jackson, Savannah river	182,000
43	Fort Clinch, Amelia island, Fla	170,000
44	Fort Marion, St. Augustine, Fla	51,394
45	Fort Taylor, Key West, Fla	1,130,000
46	Fort Jefferson, Garden Key, Fla	1,122,188
47	Fort Pickens, Pensacola harbor, Fla	774,193
48	Fort McKee, Pensacola harbor	444,426
49	Fort Barrancas, barracks, and redoubt, Pensacola harbor	596,504
50	Fort Morgan, Mobile point, Ala	1,342,552
51	Fort Gaines, Dauphin island, Mobile bay	221,500
52	Defences for inner passes into Mobile bay	150
53	Fort on Ship island, coast of Mississippi	80,197
54	Military defences at Proctor's Landing, La	150,000
55	Lower Dupre, Bayou Dupre, La	88,976
56	Battery Bienvenne, Bayou Bienvenne, La	129,571
57	Fort Macomb, Chef Menteur pass, La	465,991
58	Fort Pike, Rigolets pass, La	473,001
59	Fort Jackson, Mississippi river, La	887,096
60	Fort St. Philip, opposite Fort Jackson, La	258,734
61	Fort Livingston, Barrataria bay, La	362,879
62	Defences for Galveston harbor, Texas	500
	Total on Atlantic and gulf coast	$26,996,621
	On the Pacific Coast.	
1	Fort at Fort point, San Francisco bay, Cal.	1,338,834
2	Fort at Alcatraz island, San Francisco bay	896,666
	Total on Pacific coast	$2,450,500
	Recapitulation.	
	Amount for works on the northern frontier	$730,250
	Amount for works on Atlantic and gulf coast	26,996,621
	Amount for works on Pacific coast	2,450,000
	Total	$30,176,871

FORTUNA, the goddess of chance, both happy and unhappy, called by the Etruscans Nursia. Among the Greeks she was known under the name of Tyche, as the daughter of Oceanus, according to Hesiod, and as the sister of the Mœræ and Parcæ, according to Pindar, and had her temples at Smyrna and other cities. She was worshipped in Italy in the earliest times by the Etruscans at Volsinii, by the Latins at Præneste, and by the Volsci at Antium, where she had a temple, two statues, and an oracle, whose responses were highly valued. She was diversely represented as blind, with wings on her feet, which she was believed to lay aside when entering Rome, with a crescent on her head, a helmet, cornucopia, or globe in her hand, and resting on a wheel.

FORTUNATE ISLANDS. See Canary Islands.

FORTUNE, Robert, a Scottish botanist, born in Berwickshire in 1813. He was brought up as a horticulturist, and having procured employment in the botanical gardens of Edinburgh, availed himself of the privilege afforded to young gardeners occupied there of attending the lectures of the university professor. He also went through a course of private reading, and upon his promotion to a post in the botanical gardens at Chiswick so recommended himself by his acquirements and intelligence, that after a severe examination he was appointed by the London horticultural society as collector of plants in northern China, which the peace of 1842 had just thrown open to Europeans. His "Three Years' Wanderings in the Northern Provinces of China" (2 vols. 8vo., 1847; 3d ed. 1853), published soon after his return, beside affording full information of the horticulture and agriculture of the Chinese, is one of the most entertaining books of travel recently written. After superintending for several months the gardens of the apothecaries' company at Chelsea, he again departed in the latter part of 1848 for China, under the auspices of the East India company, to examine and report upon the nature and method of cultivating the tea plant and to collect its seeds and introduce its culture into northern India. After an absence of more than 3 years, he returned to England and published his valuable work, entitled "Two Visits to the Tea Countries of China" (2 vols. 8vo., 1852). Scarcely had this gone through the press when he departed on a third tour to the same country, the results of which were given in his "Residence among the Chinese: Inland, on the Coast, and at Sea; being the Third Visit from 1853 to 1856" (8vo., 1857). In 1857 Mr. Fortune was employed by the U. S. patent office to visit China to collect the seeds of the tea shrub and of other plants, with a view to the introduction of their cultivation into the United States. He proceeded from England by the overland route directly to the tea districts in the middle and northern provinces of China, where he remained until March, 1859, and collected a large quantity of seeds, which he shipped to the United States, where they arrived in April, May, and June, generally in good condition. Mr. Fortune left Hong Kong March 15, and arrived in England in May, at which time his engagement with the patent office terminated.

FORUM, in ancient Roman cities, an open place, surrounded with public buildings, which was originally used for the administration of justice or the sale of goods, and subsequently for the transaction of all kinds of public business. In this respect it corresponded with the *agora* of

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the Greeks; but unlike the agora, it was oblong in form, and never square. The Romans had two kinds of *fora*, the *civilia*, sometimes called *judicialia*, in which popular assemblies and courts of justice were held, and where the bankers and usurers usually kept their shops; and the *venalia*, which were used exclusively for mercantile purposes. The city of Rome contained 19 of both kinds; but the *forum Romanum*, whose origin is coeval with that of the city, and which is known by the general name of the Forum, was by far the most important, notwithstanding some very magnificent ones were built under the emperors. It occupied a hollow space between the Capitoline and Palatine hills, extending probably from the arch of Septimius Severus to the temple of Antoninus and Faustina (although its limits have been the subject of much controversy), and comprised an area of 7 jugera. Around its 4 sides stood temples, *basilicæ*, triumphal arches, and other public edifices, while within it were the *rostra* or stages from which orators addressed public assemblies, statues of illustrious Romans, columns, and trophies of war. At the *comitium* or upper end were suspended the laws of the 12 tables, and the *fasti* or calendar of all the days on which it was lawful to work. It is now known as the Campo Vaccino, from having been used for several centuries as a cattle market, and preserves no traces of its ancient splendor beyond a few scattered columns of temples. A *forum judiciale* was built by Julius Cæsar, and one by Augustus, which, with the *forum Romanum*, seem to have constituted the only ones in Rome for the transaction of public business. The others were used as markets, or were simply embellishments of the city.

FORWARD, Walter, an American jurist and statesman, born in Connecticut in 1786, died in Pittsburg, Penn., Nov. 24, 1852. At the age of 17 he emigrated from New England to what was then the West, and settled at Pittsburg, where he studied law. He engaged early in politics, and in 1806, when he was only 19 years of age, he edited a democratic newspaper called the "Tree of Liberty." He was admitted to the bar in 1806, and for 16 years practised with success, acquiring a high reputation as an eloquent advocate. In 1822 he was elected to congress, as a representative from the western district of Pennsylvania, and served till March 4, 1825. In the presidential elections of 1824 and 1828 he supported John Quincy Adams in opposition to Andrew Jackson, and thenceforward he was identified with the whig party. In 1837 he was elected a member of the convention to reform the constitution of Pennsylvania, and bore a distinguished part in its deliberations. In March, 1841, President Harrison appointed him first comptroller of the treasury of the United States. In September of the same year President Tyler, on the resignation of the cabinet appointed by President Harrison, called Mr. Forward into his cabinet as secretary of the treasury. In this office he exercised great influence on the tariff question, and contributed much to the enactment of the act of 1842 by an able official report on the subject. On retiring from the cabinet on the expiration of Mr. Tyler's term in 1845, Mr. Forward resumed the practice of the law at Pittsburg. In 1849 President Taylor appointed him U. S. chargé d'affaires at the court of Denmark, where he remained 2 or 3 years, when he resigned and came home to take the office of president judge of the district court of Alleghany co., Penn., to which he had been elected in his absence. While in court, engaged in his judicial duties, he was suddenly taken ill and died in 48 hours.

FORWARDING MERCHANT, one whose business it is to send forward goods to a distant consignee. There are in the United States persons who engage in this business almost exclusively, especially in the western cities, in which produce accumulates on its way to the East, and to which eastern goods are carried for distribution through the West. There is nothing, however, in their business which is so far peculiar to them as to be governed by peculiar laws of its own, and therefore call for especial statement. But there are two classes of persons who come under this name, or discharge the duties which it describes, and of whom more should be said. One of these consists of those who are called expressmen, and the other of common carriers, who, beside carrying goods on their own route, undertake to forward them still further. The whole business of expressmen is of comparatively recent origin; but it has already reached an immense extent and importance. It has grown out of common carriage of goods, but differs from it mainly in the fact that expressmen have no means of carriage of their own, but hire cars or vehicles, or room in them, and usually go with their parcels. It may be said, too, that they usually carry parcels only, or if larger packages, still not cargoes or large quantities of goods, as hundreds of barrels or bales, the carriage of these things being still left to common or private carriers. The principal question in relation to expressmen is, are they still common carriers in law, and do they as such come under the strict responsibilities of common carriers? In other words, do they insure the safe carriage and delivery of all the goods against all risks "except the act of God and the public enemy?" We have no doubt whatever that they do thus insure the goods they receive throughout the whole route for which they profess to be carriers, and that they are therefore liable for any loss or injury to them, without any proof or intimation of their negligence or default. We hold, too, that no customer is bound to inquire by what means or by what arrangements the expressman proposes to carry his parcel. If he receives it in Portland, and undertakes, specially or by general advertisement, notice, or sign, to "express it through" (to use a common phrase) to New Orleans or San Francisco, he is responsible for its safe delivery there. —A railroad company which takes goods at one place to be carried to a distant one might be

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thought to come necessarily under the same rule, but it is not quite so. There is this difference between the two cases: the expressman has not, or is not known to have, any regular means of conveyance of his own for any definite portion of the distance over which he assumes to carry the goods. The owner who gives him a parcel in Portland for New Orleans has no means of knowing, and indeed no reasons for supposing, that the expressman has not made similar arrangements for all the parts of his route that he has made for any part. It is indeed commonly understood that every expressman does not undertake to convey goods everywhere, but this man advertises from A to B, because he has so arranged and provided, and that man from A to C, and the other from A to D; and his advertising, or indeed his undertaking to carry to the specified place, may properly be understood as a declaration on his part that he has made sufficient preparation in that direction and to that distance. But if the man in Portland puts goods on board a railroad car to go to New York, he knows, or should know, that the railroad company will convey it a certain part of the way in their own carriage, and under the charge of their own servants, and will not and cannot do any thing beyond that point except to put it safely on board of the cars of another company, who will take it to or toward New York. That is, the man in Portland knows that the railroad company will there receive the parcel as a carrier, and take it a certain distance as carrier, and will then act as a forwarding merchant for the rest of the route, sending it on in the best way they can. Here then is a change of relation, and with it a change of obligation; for the essential difference is this: a common carrier insures his goods against all risks but those arising from the act of God or the public enemy; but the forwarding merchant is liable only for his own default or neglect. If a company takes a parcel in Portland, and it is lost between Boston and Worcester, no one knows how, the sender can look at once to the company that took it, if they are carriers all the way, but not if they were carriers only to Boston, where their road ends, and only forwarding merchants for the rest of the route, and can show that they delivered the parcel safely and properly for further carriage. If it is known where the parcel is lost, the sender may always call on the company who had it in their possession or under their care when it was lost. But if, as sometimes happens, it can be traced beyond the first carrier, and no negligence can be imputed to him, and no one knows what has become of it, the sender is wholly remediless unless the first carrier is carrier to the end. Whether he is so or not has been very much disputed. Cases turning on this point have been very frequent both in England and the United States, and perhaps the law may not be positively determined in either country. Perhaps it may be said that the English courts are more disposed to fix the liability of carrier to the end upon the party that first takes charge of a parcel than our own courts; but upon the whole, and resting upon the most recent adjudications, the rules of law in this matter may be summed up thus. There may be a partnership in the business of common carriage as in all others, and a railroad company may connect itself with other companies or with other carriers, and form a *quasi* partnership, the effect of which will be that each member will be liable, *in solido*, for all the rest. In that case, all the companies on the whole route are liable for a loss occurring in any part; and in particular the first company taking the parcel, or the last into whose hands it may be traced, may be made liable severally for any loss which has happened on the route. The company comes under such a liability equally by forming such a partnership and entering into such a joint business, or by advertising or indicating such a joinder in business, in any way which entitles third parties to act on the belief of it. And if such companies have a joint agent at either terminus or at any station, and this agent, with the knowledge of all, and purporting to act for all, sells a through ticket, as it is called, none of the companies thus represented can deny their joint business and joint or several liability for the whole; and if the price of the ticket is credited by the seller to all the companies and is divided among them, this constitutes conclusive evidence that each of them undertakes to be a carrier, with a responsibility as such, through the route. But the mere fact that a parcel directed to a distant place is received at a station, and there paid for for the whole route, does not of itself make any carrier for a part of the distance liable as carrier beyond that part. The test of the liability in every case is, what did the party undertake to be and to do? If he said he would carry all the way, he is liable as carrier all the way. If he said he would carry a part of the way and then send it on, he is only liable accordingly. And taking all the facts into consideration, which of these bargains was it that the railroad company made with the sender?—With this principle to guide us, we may return to expressmen. A person living at Albany wishes to send by express a parcel to New Bedford. He gives it to an expressman of Albany, who takes it to New York, and there gives it to the expressman for Boston, who pays the Albany man his fee for bringing it to New York, and takes it to Boston. The expressman between Boston and New Bedford pays the New York man what he paid, and also the fare from New York to Boston, and takes it to New Bedford; and the consignee when he takes the parcel pays the man who gives it to him all he has paid, and in addition his fare from Boston to New Bedford. Now, if the parcel did not arrive safely, but was lost somewhere on the route, is each one of these expressmen liable for the whole? We should say this must depend upon what each one undertakes to do. If the Albany man advertises that he takes goods to New Bedford, he is liable

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as far as New Bedford as carrier. If he advertises that he carries parcels to Boston, he is so liable to that place; if only to New York, he is liable as carrier only to New York, and as forwarding merchant at New York, and there his liability ends; and so of all the rest. (The cases on this subject of the obligation of carriers beyond their own route are very numerous; the following may be regarded as among the most important and instructive: Muschamp *vs.* L. and P. Junction railroad co., 8 Meeson and Welsby, 421; St. John *vs.* Van Santvoord, 25 Wendell, 660; Fairchild *vs.* Slocum, 19 Wendell, 329, and 7 Hill, 292; Wilcox *vs.* Parmelee, 3 Sandford, 610; Farmers' and Mechanics' bank *vs.* Champlain transportation co., 23 Vermont, 186.) Expressmen now not uncommonly insert in their bills of lading or receipts which they give their customers a clause to this effect: "This company is responsible only as forwarders, and only for the negligence or other default of persons employed by them; and this is a part of our contract with all whose goods we carry." We must wait, perhaps, for further adjudication before we know certainly the effect of this clause. But applying to it the rules of law as far as they are now settled, we should say that a common carrier may make a valid special bargain with his customer, but that a mere notice or declaration inscribed upon a ticket or bill of lading does not of itself constitute such a notice.

FOSCARI, Francesco, 45th doge of Venice, born about 1372, died Oct. 31, 1457. Elected doge in 1423, the whole period in which he governed the republic was one of war and tumult. The sultan Amurath laying siege to Salonica, Foscari despatched troops thither, who repelled the Mussulmans. He then engaged in hostilities with the duke of Milan, Filippo Visconti, and subjected to the republic the territories of Brescia, Bergamo, and Cremona, making the Adda the boundary of Venetian dominion. The war was soon renewed with various success, nearly all the Italian cities taking part in it; but the doge, supported by Cosmo de' Medici and by Francesco Sforza, marquis of Ancona, still further extended his power by a treaty concluded in 1441. In 1443 he formed a league with Sforza, the duke of Milan, and the republics of Genoa, Florence, and Bologna, against Alfonso of Aragon, king of Naples. The pope took part with the latter, but two victories of Sforza put an end to the war. In his old age he had made peace with all the enemies of Venice, including Mohammed II., when Jacopo, the last survivor of his 4 sons, was brought a second time before the terrible council of ten, falsely charged with the assassination of its chief. The tribunal, jealous of the power and popularity of the doge, condemned his son first to tortnre and then to exile in Crete. The young Foscari, whose mind was disordered by suffering, wishing after long banishment to see his country again at whatever peril, effected his return thither, but being condemned again, had scarcely reached the place of exile when he died. This event is the subject of one of Lord Byron's tragedies. For the old doge one other humiliation remained. He had twice asked leave to resign his office, but the council had obliged him to retain it. He was now deposed, through the machinations of his enemies, and died 3 days after in a spasm as he heard the bells of St. Mark announce to Venice the election of a new ruler.

FOSCOLO, Nicolo Ugo, an Italian poet and miscellaneous writer, born in the island of Zante, of a Venetian family, in 1777, died at Turnham Green, near London, Oct. 10, 1827. He was educated in Venice, and in the university of Padua. His first tragedy, *Tieste*, was produced at Venice in 1797, and was so unsatisfactory to the author that he himself published the severest criticism of it that appeared. Expecting the establishment of a republic when the ancient aristocracy of Venice fell by the hands of Napoleon, his hopes were disappointed by the treaty of Campo Formio, which gave up Venice to Austria. He retired with other patriots to Milan, and wrote a political romance called *Lettere di due amanti*, afterward republished under the title of *Le ultime lettere di Jacopo Ortis*. In 1799 he volunteered in the Italian contingent of the French army, took part in the defence of Genoa under Massena, and returned to Milan, where his time was divided between books and pleasure. When in 1802 Napoleon assembled the *consulta* of Italian deputies at Lyons to provide a new constitution for the Cisalpine republic, Foscolo was appointed to report upon the state of the country; and in an elaborate discourse, so bold that it was deemed unsafe to submit it to the first consul, but which was afterward published under the title of *Orazione a Buonaparte*, he contrasted the abuses of the military government which had been established with the free government which had been promised. In 1808 he was appointed professor of Italian eloquence in the university of Pavia, but the political independence evinced in his lectures caused his chair to be soon suppressed. At this period he published his beautiful lyric poem *I sepolcri*, his tragedy of *Ajace*, and an Italian translation of Sterne's "Sentimental Journey." On the fall of Napoleon he retired to Switzerland, and in 1816 to England. He wrote for the "Edinburgh" and "Quarterly" reviews articles on Dante, Petrarch, Boccaccio, and other Italian authors, delivered a course of lectures on Italian literature, published a volume of "Essays on Petrarch" (1823), and edited an edition of the *Divina Commedia* of Dante (1825).

FOSSANO (anc. *Fons Sanus*), a city of Piedmont, in the province of Coni, situated on the left bank of the Stura, 13 m. N. E. of Coni, and 37 m. S. E. by railway from Turin; pop. in 1853, 16,041. It is an antique, dismal, but regularly planned town, surrounded by walls, and defended by a strong fortress, which commands the valley of the Stura and the road into France by the Col d'Argentière. The houses

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are built upon arches over the footpaths, and the passages in many places are so low that a tall person can hardly walk upright in them.

FOSSIL (Lat. *fossilis*, dug out of the ground), a term formerly applied to all mineral substances, but now used to designate only the remains of organic bodies found in geological formations. The general subject will be treated under the title PALÆONTOLOGY, and the more important fossil animals are considered under their respective names.

FOSSIL FOOTPRINTS, or ICHNOLITES (Gr. ἰχνος, track, and λιθος, stone), impressions of the feet of animals, originally made in clay, sand, or mud, and retained in the shale or sandstone resulting from the petrifaction of these materials. They are met with chiefly in the new red sandstone formation, or in the overlying strata of the lias. In a few instances they have been found in the old red sandstone or upper devonian, both in this country and in Europe. The tracks are of extinct genera of animals, and frequently of forms so strange that there is some uncertainty in referring them to their appropriate order or even class in the animal kingdom; and it is indeed a question as to some of them whether they belong to the invertebrate crustacea, or to the mammalia of the higher division of vertebrata. Many are unmistakably the tracks of reptiles; some are of batrachians, others probably of marsupials, and others of birds; while the place of many cannot be positively determined in the last 3 represented classes. The tracks vary in size from gigantic impressions 20 inches in length by 13 to 15 in breadth, supposed to belong to monster batrachians, to minute marks, which resemble those made by small isopod crustaceans, or those of the sow-bug group. They follow each other in lines over the surface of the strata, and as the slabs are split open the depressions are found to extend through many layers, precisely as is seen in tough foliated clay when the foot of an animal sinking in disarranges and permanently compresses its foliæ.—Public attention was first directed to these fossils by the Rev. Dr. Duncan of Scotland, in his paper, accompanied with drawings, presented to the royal society of Edinburgh in 1828. In this he described the tracks found in great abundance in two quarries of new red sandstone in Dumfriesshire, appearing on the successive layers of the rock throughout a thickness of at least 45 feet. He inferred from the repetition of their occurrence, that during the deposition of the sand of which the rock was composed the impressions were made, filled in, and buried up; and as the newer layers were similarly impressed, they too were covered in their turn. He observed one line of tracks extending from 20 to 30 feet. Dr. Buckland regarded them as the tracks of land tortoises. In the "Geological Proceedings" for March, 1831, is a description, by Mr. Scrope, of impressions of footsteps resembling those of crabs seen upon the surface of calcareous tilestones of the lower oolite in Wilts and Gloucestershire. In the same formation (the forest marble) were found fossil remains of crabs. The next discovery of fossil tracks was near Hildburghausen, Saxe-Meiningen, in 1834, in the member of the new red sandstone called *bunter Sandstein*. They were made apparently by a reptile, and were seen as impressions upon the upper surface, and in relief on the under side of the slabs; one measured 12 inches in length; others were 8 inches long and 5 broad. A little in front of each large track was a smaller one, and the footsteps were seen following each other in pairs, the intervals between two pairs being about 14 inches. Five toes were imprinted in each track, the great toes appearing alternately on one and the other side. The animal was named *cheirotherium* by Prof. Kaup, from the resemblance in the form of the track to that of the hand. Similar impressions were afterward found in a rock of corresponding age near Liverpool, England. In studying the fossil remains of reptiles that had been found in this division of the new red sandstone in Germany and in England, Prof. Owen was convinced that instead of saurians, to which they had been referred, they belonged to the batrachian order, and were the remains of frogs of gigantic size. Further investigations resulted in the opinion that these were the animals that made the tracks. Some features in the fossil bones induced other distinguished anatomists to regard them as belonging to crocodiles, and by others again they are referred to the marsupialia.—Fossil tracks had been found in the sandstone of the valley of the Connecticut at South Hadley, Mass., as far back as the year 1802, which resembled so closely those of birds, that they were familiarly spoken of as the tracks of "poultry" and of "Noah's raven." They attracted, however, no attention beyond the immediate vicinity where they were found. In 1835 others of similar character were observed in the flagstones at Greenfield, Mass., which were brought from the neighboring town of Montague. These tracks were so clear and well defined, that they commanded the attention of those employed about them, and one of the laborers at least was induced by the singularity of the phenomenon, like Hugh Miller while observing the fossils in the red sandstone he quarried, to become a faithful student and zealous collector in this department of geology. (See the letter of Dexter Marsh to the editor of the "American Journal of Science," vol. vi. new series, p. 272.) Among others, Dr. James Deane of Greenfield became interested in these tracks, and in March, 1835, addressed a communication to Prof. Hitchcock, state geologist, in which he represented them as the tracks of birds, as he supposed, "of the turkey species;" and in a second letter, against Prof. Hitchcock's declaration in reply, "that they could not be the result of organization," he maintained his conclusion that they were the tracks of birds. He then caused casts to be made of some of the specimens, which he sent in April with a third communication to Prof. Hitchcock, and another also to Prof. Sil-

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liman, editor of the "American Journal of Science," the latter intended for publication. By advice of Prof. Hitchcock, this disposition was not made of the communication for the "Journal," on the ground that he himself would be able to give in a few months a more full and satisfactory paper. During the ensuing summer Prof. Hitchcock occupied himself assiduously in investigating this subject, and near the close of the year he prepared the paper which appeared in the number of the "Journal" for Jan. 1836. In this he compared the tracks with those of living birds, giving illustrations of the recent as well as fossil, and advocated the opinion that the tracks were made by extinct species of birds, and that these were for the most part of the order of *grallæ* or long-legged waders. He found them in 3 varieties of the sandstone which occur irregularly interstratified—a reddish shale, or a fine micaceous sandstone passing into shale; a gray micaceous sandstone; and a very hard sandstone, not fissile, but very brittle, composed of clay and sand. The beds attain in some places a thickness of more than 1,000 feet, the tracks occurring at intervals throughout the series. He ascertained their occurrence near the Connecticut river in 5 places within a distance of 30 miles, and anticipated that many other localities would be discovered along the range of the sandstone of the Connecticut valley within and beyond the limits named. The dip of the strata containing the tracks varied from 5° to 30°; but the impressions were evidently made while their surface was level. Their occurrence through so great a thickness of strata could only be accounted for on the supposition that the surface was subsiding during the time of the deposition of the rock. Single tracks were frequently traced in regular succession, turning alternately to one and the other side, as birds sometimes walk; and the surface of some of the layers was found to be trodden thickly over, as is seen in muddy spots resorted to by ducks and geese. Prof. Hitchcock described 7 species of tracks, which he called ornithichnites, one which he figured measuring full 16 inches in length and 10 in width, and recurring at intervals of 4 to 6 feet along the surface of the rock, which distances were thus the measure of the strides of the animal. His views, however, as he afterward remarked, were not adopted by scientific men, with a few eminent exceptions. The novelty of the subject, and the discovery of new localities and new forms of the tracks, kept alive a strong interest in the investigations which continued to be prosecuted by Prof. Hitchcock, Dr. Deane, Mr. Marsh, Mr. William C. Redfield, and others, whose observations were recorded chiefly in the "American Journal of Science." In 1840 the American association of geologists and naturalists appointed a committee to investigate the nature of the tracks, and this committee at the next annual meeting reported "that the evidence entirely favors the views of Prof. Hitchcock." The subject, already introduced to the notice of European geologists by the publications of Prof. Hitchcock, was brought prominently before the geological society of London in 1842 by Dr. Mantell, who presented a communication accompanied with specimens which he had received from Dr. Deane. These served to remove the scepticism entertained by the eminent geologists and palæontologists of Great Britain upon the nature of the tracks, admitting which to be of birds established an earlier date for the introduction of these bipeds "than was authorized by any vestiges heretofore discovered, and the thanks of the society were warmly and unanimously expressed for so valuable a communication." Other communications from Dr. Deane appeared with illustrations in the "Transactions of the American Academy of Arts and Sciences" (vol. iv., 1849), and in the "Journal of the Academy of Natural Sciences" (March, 1856); and at the time of his death in 1858 a memoir illustrated with 70 beautifully executed figures was presented to the Smithsonian institution. In 1858 the legislature of Massachusetts published an elaborate report by Prof. Hitchcock "On the Sandstone of the Connecticut Valley, especially its Fossil Footmarks," constituting a quarto volume of 232 pages with 60 plates, illustrating 119 species of animals known only by their fossil footprints found in this sandstone. The following table, found on p. 174 of the report, presents a general view of the results arrived at by Prof. Hitchcock as respects the area over which the tracks are found, their number, and their distribution in the animal kingdom according to the arrangement of the author:

Number of localities of tracks in the valley thus far discovered	33
Length of the sandstone belt containing tracks (miles)	90
Width of the sandstone belt containing tracks "	2 or 3
Whole number of species in the valley described above	119
Number of bipeds	81
Number of quadrupeds	55
With more than 4 feet	18
Without proper feet	12
With an uncertain number	3
Marsupialoid animals	5
Thick-toed birds	14
Narrow-toed birds	17
Ornithoid lizards or batrachians	10
Lizards	17
Batrachians, the frog and salamander family	11
Chelonians, the tortoise family	3
Fishes	4
Crustaceans, myriapods, and insects	18
Annelids, the naked worms	8
Of uncertain place	6

Among the most remarkable of these are some of the huge tracks supposed to belong to batrachians, the dimensions of one of which have been already given. This animal (*otozoum Moodii*), though allied to the frogs and to the salamanders, must have been like an elephant in size and weight. The bottom of the hind foot appears to have been furnished with a web, which extended beyond its margin and connected together the 4 toes, and, though compared by Prof. Hitchcock to a snow shoe, did not prevent the animal's sinking to the depth of 2 inches at least into the mud. For a long time no trace of more than the 2 hind feet was found; but finally unmistakable tracks of the fore feet were

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discovered, provided with 5 toes each, and not more than ¼ as large as the hind feet. The tracks are very abundant in South Hadley, and one immense slab, too large to be removed, lies by the side of the public road, presenting on its upper surface 10 or more great impressions of the hind feet of the animal. A view of this locality and slab is given in the frontispiece of the work. The track of the *brontozoum giganteum*, one of the thick-toed birds, is very common in South Hadley, also above Turner's falls, near Greenfield, and at other localities. It was originally described by the name of *ornithichnita giganteus*, and was figured in Buckland's "Bridgewater Treatise." The animal was probably several times larger than any ostrich. One of its tracks will hold a gallon of water. The dinornis of New Zealand is among birds the only one whose bones indicate an approach to such a size. Many tracks formerly supposed to have been made by birds are now referred to the group designated as ornithoid lizards or batrachians. This also includes some enormous specimens, as those comprised in the new genus *gigantitherium*. No trace being found of more than 2 feet, and these having 3 toes like those of birds, the animal was naturally supposed to belong to the ornithic tribe; but the discovery of a trace of a long tail in the line of the tracks, similar to that made by living reptiles, gives a batrachian character to the vestiges, which has induced Prof. Hitchcock to form this new mixed group. In the species *G. caudatum* the whole length of the foot, from the extremity of the middle toe to the end of the heel, is 17.5 inches, and the whole area covered is about a square foot. From the remarkable rectilinear arrangement of the tracks there is some ground for supposing that the animal may have had 2 other feet, with the power of walking on the 2 hind feet alone or on all four. The reference of some of these tracks to the movement of fishes, either upon the surface of the land, as some kinds are known to have the power of progressing, or by swimming close to the soft bottom, is made with hesitation by Prof. Hitchcock. One set of marks, however, cutting the summits only of the little ridges left by the ripples, so strongly suggests this origin, that a genus has been introduced under the name of *ptilichnus*, from πτίλον, fin or feather, and ἴχνος, track. The tracks referred to insects are necessarily of very obscure character; some of them are so minute as not to exceed $\frac{1}{25}$ of an inch in length. It is only by reason of their continuity in long parallel rows that they attract notice. Those supposed to be made by worms much resemble the tracks of similar creatures seen upon the mud on the shores of ponds after rains. It is remarkable that very few bones or coprolites have been found among the tracks. As to the bones, their absence may be owing to their being devoured or washed away with other vestiges by the ebb tides to other localities, or they may have been dissolved by water. Those discovered were not in the immediate vicinity of the localities that abound in tracks, though not many miles off; and although occurring in the same geological group with the tracks, the strata were evidently somewhat more recent by reason of their higher position in the series. One locality of them was at East Windsor, Conn., and another in the grounds of the Springfield armory in Massachusetts. Professor Jeffries Wyman regards them as unquestionably the bones of a reptile, but having the remarkable feature of hollowness of structure. Coprolites have been discovered at Chicopee Falls and at Turner's falls. Dr. Samuel L. Dana, on analyzing those from the former locality, detected uric acid in about the same proportion that is found in some varieties of guano. This, considered in connection with the other ingredients, led him to the conclusion that the coprolite was that of a "bird belonging to the class which has deposited the beds of guano." ("American Journal of Science," vol. xlviii. p. 60.) Impressions of raindrops, exactly like those made in soft mud during heavy showers, are very abundant over the surface of many of the slabs containing the footprints; and furrows are also frequently noticed like those left by the waves upon the sand, which are now universally recognized, even upon the strata of much older formations, and described as ripple marks.—The numerous specimens of tracks collected in the valley of the Connecticut are for the most part to be found in the cabinets of Amherst and Yale colleges, the Wesleyan university, the Boston society of natural history, and in the private collection made by Dr. John C. Warren of Boston. The trustees of the will of the Hon. Samuel Appleton of Boston appropriated $10,000 to be expended for Amherst college in the erection of a suitable building for a scientific collection. This, called the Appleton cabinet, was furnished, through the liberality of others, with sufficient funds to secure a large collection of these specimens, President Hitchcock himself contributing a series of them, valued at $2,000. The lower story of the building, 100 feet long and 30 wide, is exclusively appropriated to their arrangement, and is nearly filled with them. Some of the largest slabs are 30 feet long, and others are from 8 to 10 feet square, weighing nearly a ton each. They are generally arranged on their edges upon strong tables, and so placed that both surfaces are exposed to view, one side presenting the footprint depressed and the other in relief. The whole number of individual tracks exceeds 8,000.—Other discoveries of fossil footprints followed those made in the Connecticut valley. Mr. William C. Redfield in 1842 found one in the New Jersey red sandstone at Boonton, presenting 3 thick toes furnished with claws or nails; the track measured 6 inches in length by 3½ in breadth. Mr. Logan about the same time discovered what appeared to Prof. Owen to be reptilian tracks in the strata of the coal formation in Nova Scotia, the first indication of an air-breathing animal so low in the series of formations. This was followed in 1844 by a descrip-

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tion of numerous tracks met with at several places in Westmoreland co., Penn., by Dr. Alfred T. King. The strata which contained them were sandstones of the coal formation. The impressions were remarkably distinct, some being apparently of a biped with 3 toes, and others of quadrupeds having 5 toes, some upon all their feet, and others upon the hind feet alone, with 4 toes upon the fore feet. These vestiges were evidently reptilian, and produced by creatures of kindred structure to the *cheirotherium* of Europe. The paper of Dr. King appeared in the "Proceedings of the Academy of Natural Sciences of Philadelphia" for Nov. and Dec. 1844, and in the "American Journal of Science," vol. xlviii. p. 343. In 1849 Mr. Isaac Lea of Philadelphia announced the occurrence of footprints of a large reptile at Pottsville, Penn., in the red shale formation which underlies the coal measures; and in 1851 Prof. H. D. Rogers discovered in the same formation other tracks of 4-footed animals, with 5 toes on all their feet. In 1850 tracks of a reptile, supposed to be a chelonian, were observed in the old red sandstone at Cummingstone, England. Mr. Logan in 1852 found tracks of an animal in the Potsdam sandstone of Canada, which are supposed by Prof. Owen to have been made by more than one species of articulate animals, probably allied to the king crab or *limulus*. Prof. James Hall, in the "Report on the Palæontology of New York," vol. ii., describes tracks of gasteropoda, crustacea, &c., which are met with in the strata of the Clinton group.

FOSTER, JAMES, an English dissenting minister, born in Exeter, Sept. 16, 1697, died Nov. 5, 1753. He was educated in his native city, began to preach in 1718, and after removing from Devonshire to Melbourne, and thence to Ashwick, succeeded Dr. Gale as pastor in Barbican, London, in 1724. He subsequently became lecturer at the Old Jewry, and in 1744 minister at Pinner's hall. His reputation for eloquence was such that persons of every rank, wits, free thinkers, and clergymen of different persuasions, flocked to hear him. Pope sang his praise:

> Let modest Foster, if he will, excel
> Ten metropolitans in preaching well;

and Savage ascribed to him alone the art "at once to charm the ear and mend the heart." Bolingbroke erroneously attributed to him the saying: "Where mystery begins, religion ends." Beside many sermons, he published an "Essay on Fundamentals, especially the Trinity" (1720); "Defence of the Usefulness, Truth, and Excellency of the Christian Religion" (1731); and "Discourses on the Principal Branches of Natural Religion and Social Virtue" (London, 1749–'52).

FOSTER, JOHN, an English essayist, born in Halifax, Yorkshire, Sept. 17, 1770, died at Stapleton, near Bristol, Oct. 15, 1843. In early life he was engaged in the business of a weaver, to which, however, as to all manual labor, he had an invincible dislike; and at the age of 17, having united with the Baptist church, he resolved to devote himself to the ministry, and finished his studies at the Baptist college in Bristol. He commenced his career as a preacher at Newcastle-on-Tyne in 1792, and afterward went to Dublin, and endeavored unsuccessfully to establish himself either as a preacher or schoolmaster. In 1797 he went to a Baptist chapel in Chichester, and thence successively to Downend in 1800, and to Frome in 1804; but though his preaching was powerful, it made little or no impression on the popular mind. While at Frome he first published his celebrated "Essays," and also became the principal contributor to the "Eclectic Review," the articles for which (185 in number) formed his almost exclusive literary labor for 13 years. In 1817 he returned to Downend, where he wrote his "Essay on the Evils of Popular Ignorance," in which he gives an appalling description of the barbarism prevailing in the lower classes of the English population,—a spectacle which he calls "a gloomy monotony; death without his dance." His health failing, he then employed himself chiefly in preparing works for the press, though preaching at intervals until his death. He was a profound thinker and a powerful writer. The "Life and Correspondence" of Foster (2 vols. 8vo.), edited by J. E. Ryland, was published in 1846. His "Historical and Biographical Essays" appeared in London in 1859 in 2 vols.

FOSTER, RANDOLPH S., D.D., an American Methodist clergyman, born in Williamsburg, Ohio, Feb. 22, 1820. He received his education at Augusta college, Ky., entered the ministry at the age of 17, and was received into the Ohio conference, and appointed to travel a circuit in the mountain region of western Virginia. While stationed in Cincinnati in 1848 he wrote a series of letters entitled "Objections to Calvinism." In 1853 he received the honorary degree of D.D. from the Ohio Wesleyan university. In 1854 he published a work entitled "Christian Purity;" in 1855 another entitled the "Ministry for the Times." In 1856 he was elected president of the North-Western university at Evanston, Ill., a post he still holds.

FOTHERINGAY, a parish and village of Northamptonshire, England, on the river Nene, 27 m. N. E. of Northampton. Its famous castle, the birthplace of Richard III., and the scene of the imprisonment, trial, and execution of Mary, queen of Scots, was founded in the reign of the Conqueror, and pulled down by James I. soon after his accession to the English throne. The village contains a handsome church, in which were buried Edward and Richard, dukes of York, the former slain at Agincourt and the latter at Wakefield.

FOUCAULT, LÉON, a French natural philosopher, born in Paris, Sept. 18, 1819. While studying medicine he was deeply impressed by the discoveries of Daguerre, and turned his attention exclusively to optics. He rapidly acquired proficiency in this branch of natural philosophy, and in 1844 he invented an illumi-

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nating electric apparatus, which was at once adopted by natural philosophers for all their physical experiments, while it was also used as a means of lighting large factories or yards. With Hippolyte Fizeau he made a series of delicate and valuable experiments upon the phenomena of light. He solved a problem which had attracted the attention of Wheatstone, Arago, and many others; demonstrating, by a very ingenious contrivance, that the velocity of light differs materially while passing through a vacuum or through transparent bodies. He was no less successful in mechanics than he had been in optics; by means of the pendulum he gave a new and striking demonstration of the rotatory motion of the earth; and by this curious experiment, which has been repeated all over the world by scientific men and learned societies, Foucault is perhaps better known than by almost any of his other discoveries. The gyroscope, another instrument with which he experimented, not only affords new indications of the earth's rotation, and serves to measure it, but furnishes a means of determining astronomical positions without observation of the heavens. Foucault was rewarded for his labors by an appointment to an important post in the imperial observatory at Paris, and since 1845 he has been engaged in furnishing weekly scientific papers to the *Journal des débats*.

FOUCHÉ, Joseph, Napoleon's minister of police, born at La Martinière, near Nantes, May 29, 1763, died in Trieste, Dec. 25, 1820. A delicate constitution unfitted him for the profession of his father, who was a ship owner and sea captain. He was sent to Paris to study at the *Oratoire*, but did not take holy orders. He officiated as professor of philosophy in Arras and other towns, and in 1788 was placed at the head of the college of Nantes. He married about that time, became an advocate, founded a republican association in Nantes, was chosen in 1792 member of the national convention, voted for the immediate execution of Louis XVI., and in 1793 proceeded to Lyons with Collot d'Herbois, charged with the execution of the decree issued by the convention against that city. During the course of 5 months several thousand persons were put to death at Lyons, and more than double the number were driven into exile. By means of a telescope Fouché was an eye-witness of some of those butcheries from a distance. One of them took place under the window of a hotel, where with 30 Jacobins and 20 courtesans he was engaged at dinner, and the party rose from the table to enjoy the bloody spectacle. After his return to Paris he was elected president of the Jacobin club (June 4, 1794). His influence and opposition gave umbrage to Robespierre, who caused him to be expelled from the club; but he rejoined it after the execution of Robespierre (July 28, 1794), upon whom he now endeavored to throw all the odium of his violent proceedings at Lyons. But he was denounced as a terrorist, driven from the convention (Aug. 9, 1795), and placed under arrest, but restored to liberty by the amnesty of Oct. 26, 1796. He afterward succeeded in ingratiating himself with Barras, the president of the directory, by betraying to him the movements of Babeuf. The latter was guillotined in 1797, and Fouché was rewarded with a large interest in the outfit of the army, and in Sept. 1798, by being made ambassador to the Cisalpine republic. In the beginning of 1799 he was sent in the same capacity to Holland, but was soon called to Paris to enter upon the duties of minister of police (July 31). He adopted rigorous measures against political agitators, without distinction of party, coöperated in the *coup d'état* of the 18th Brumaire (Nov. 5, 1799), and strengthened Bonaparte's position by his vigilance in detecting royalist and Jacobin conspiracies; but the first consul, who distrusted the mercenary and intriguing disposition of his minister, discarded him as soon as the apparent return of tranquillity rendered it practicable to dispense with his services. The suppression of the ministry of police, and the union of the office with the ministry of justice under the charge of a superior judge, was the pretext for his dismissal (Sept. 1802). He was made a senator, a post which yielded him about $13,000 annually, and Napoleon rewarded him beside with half of the reserve fund in the treasury of the police, which amounted to nearly $500,000. In 1804, when Napoleon's position became more complicated, Fouché was again employed. He opposed the execution of the duke d'Enghien, and told Napoleon "that it was worse than a crime, that it was a blunder;" a saying which has since become proverbial. After the establishment of the empire, he was formally reinstalled as minister of police (July 10, 1804), and under his administration tranquillity and order were secured at home, while Napoleon was engaged in fighting his battles abroad. In 1809 he received the title of duke of Otranto, with a large pension from the revenues of the kingdom of Naples. In the same year, at the time of the landing of the English on the island of Walcheren, while Crétet the minister of the interior was sick, Fouché managed his department along with his own, and caused the whole national guard of France to be put in motion. In his letters to the prefects he referred to the absence of the emperor, and called upon France to show to Europe that although the genius of Napoleon imparted glory to France, his presence was not required to protect the country. The last expression gave offence to Napoleon, although he approved of his measures in themselves. In the following year, Napoleon having opened secret negotiations with the court of St. James, Fouché, in ignorance of this fact, and without consulting the emperor, despatched the speculator Ouvrard to London with the same object; upon which the English government put an end to all negotiations, and Fouché was dismissed (June 5, 1810). Savary became his successor, and the governorship of Rome was assigned to Fouché, as a sort of honorable exile. But though he did not go to Rome, he was compelled to leave France, on

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his refusing to surrender certain autograph letters of Napoleon and other important documents, and was only permitted to come back on condition of giving them up. In 1813, Napoleon was again obliged to endure his indispensable services, and employed him as governor of Illyria and in other capacities. But he was among the first to foresee the approaching end of Napoleon's power, and having been sent to Rome he governed his conduct in anticipation of the fall of his master, and concluded a treaty with Murat respecting the evacuation of the fortresses under the condition that the garrisons should not serve against the allies for a year. In Jan. 1814, he wrote to the emperor from Rome, recommending the adoption of a more conciliatory policy. Returning to France in the spring, he announced at Lyons and at Avignon the approaching fall of Napoleon, and entered Paris 2 days before the count d'Artois. On April 23 he wrote again to Napoleon, urging him to leave Elba for the United States. At the same time he put himself in communication with the Bourbons. They suspected him, however, and on Napoleon's return from Elba issued an order for his arrest; but he contrived to make his escape, and became for the 3d time Napoleon's minister of police, while he was at the same time Talleyrand's correspondent, the tool of the court of *émigrés* at Ghent, and the bosom friend of the liberal deputies in the chamber. After the battle of Waterloo he sent for Dupont de l'Eure, Lafayette, and others, and made use of their republican feelings to precipitate the overthrow of the emperor; and after his master's final abdication he became the leader of the provisional government (June 23, 1815). He was appointed for the 4th time minister of police by Louis XVIII. (July 6), but, placed between the opposition of the extreme republicans and the extreme royalists, his position became intolerable. He presented to the king 2 reports on the disturbed state of France, which created a great sensation, and which are the best of his political writings. He resigned the ministry Sept. 19, 1815, and was appointed ambassador at Dresden, but was deprived of that office by the law of Jan. 16, 1816, which affected all who had voted for the death of Louis XVI. From Dresden he removed to Prague, where he spent about 2 years; and having become in 1818 a naturalized subject of Austria, he resided for some time in Lintz, and for the rest of his life in Trieste. In 1815, 2 years after the death of his first wife, he married Mlle. de Castellane, whose family was one of the most influential in Aix; so great was the charm of his intellect and conversation, that he gained her affections notwithstanding his advanced age. She died in 1850. His fortune was immense, and he left to his children nearly $3,000,000. His domain of Ferrières et Pontcarré, which now belongs to the Rothschilds, was one of the finest in France. Napoleon is reported to have said in St. Helena: "Fouché is a miscreant of all colors, a priest, a terrorist, and one who took an active part in many bloody scenes of the revolution. He is a man who can worm all your secrets out of you with an air of calmness and unconcern. He is very rich, but his riches have been badly acquired. He never was my confidant. Never did he approach me without bending to the ground; but I never had esteem for him. I employed him merely as an instrument." Bourrienne says: "Fouché never regarded a benefit in any other light than as a means of injuring his benefactor." The *Mémoires de Fouché*, published by Alphonse de Beauchamp in 1824, have been declared apocryphal by the courts in Paris, at the suit of the heirs of Fouché. But it is known that Fouché left memoirs in manuscript, and it is supposed that some of them were used by M. de Beauchamp.

FOULD, Achille, a French statesman, born of Jewish parents in Paris, Oct. 31, 1800. At an early age he entered the counting house of his father, who died in 1855, and who was the head of the still existing banking firm of B. L. Fould and Fould Oppenheim. In 1842 he was elected to the chamber of deputies, and in 1848 to the constituent assembly. Having repeatedly given evidence of his financial ability and political dexterity, and above all of his loyalty to Louis Napoleon, he became his confidant and private banker, and in 1849 his minister of finance. He retired from the ministry, Jan. 25, 1852, on occasion of the confiscation of the property of the Orleans family, to which he was opposed. He was made a senator, and afterward minister of state (July 30), and minister of the imperial household (Dec. 14, 1852).

FOULIS, Robert, a Scotch printer, born in Glasgow, April 20, 1707, died in Edinburgh in 1776. He was a barber's apprentice, but falling under the notice of Dr. Hutcheson, professor of moral philosophy at Glasgow university, was encouraged to perfect his education and become a printer and bookseller. In company with his brother Andrew (born Nov. 23, 1712, died Sept. 18, 1775) he made journeys to England and the continent during the summers in connection with his new business, and employed his winters in teaching. In 1739 he was enabled to open a shop in Glasgow, and in the following year to commence publishing. In 1743 he was appointed printer to the university, and afterward took Andrew into partnership. Their editions were remarkable for correctness and elegance, those of the Greek and Latin classics ranking with the best of the famous Aldine series. The Foulis edition of Demetrius Phalereus *De Elocutione* (1743) is thought to be the first Greek work published in Glasgow. Among the most valuable productions of this press were: Horace (12mo., 1744), the sheets of which were hung up in the university with the offer of a reward for the discovery of any error in them; Homer (4 vols. fol., 1756–'8); Thucydides, in Greek and Latin (8 vols. 12mo., 1759); Herodotus, in Greek and Latin (9 vols. 12mo., 1761); Xenophon, in Greek and Latin (12 vols. 12mo., 1762–'7); Gray's poems,

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Pope's works, &c. The two brothers acquired in time an ample fortune, which they lost by an unsuccessful attempt to establish at Glasgow an academy of painting and sculpture for the instruction of young men.

FOUNDATION, a term applied to that portion of a building which serves as a basis on which to erect the superstructure. Foundations may be divided into two classes, natural and artificial. The first class may be again divided into foundations on dry ground and foundations under water. Under the first of these subdivisions several cases may be considered, depending upon the character and position of the bearing stratum; if this be of solid rock or indurated gravel, no further precaution will be required than to level the foundation pit, that the masonry may start from a horizontal bed; any irregularities which may occur should be filled with concrete rather than with masonry, as the compression of the mortar joints will inevitably cause irregular settlement, unless cement is employed, and the mortar joints kept as close as possible. Gravel forms one of the best of soils on which to build, being nearly incompressible, easily levelled, and unaffected by exposure to the atmosphere. Sand, too, is almost incompressible, and as long as it can be kept from escaping, can be employed with advantage. Solid rock is not desirable in practice, owing to the labor and expense of levelling it, and the difficulty usually experienced in large works of forming the bed entirely of this material, and of thus avoiding the danger of irregular settlement. A striking illustration of the latter difficulty occurred in building the piers of a large aqueduct, as mentioned by Hughes in his "Papers on the Foundations of Bridges;" 10 of these piers were founded on gravel, and the masonry appeared without a flaw when carried up to the height of 50 feet; the 11th, however, was founded partly on gravel and partly on very hard rock, and after being carried up to about 30 feet was fissured throughout its entire height, owing to the gravel yielding slightly, while the rock was incompressible. As instances of the expense of preparing a level bed in hard rock, we may mention the Eddystone, Bell Rock, Skerryvore, and Minot's Ledge lighthouses. For foundations under water, it is often sufficient, and generally feasible except in the case of a rock bottom, to bring up a number of isolated supports or piles. In other instances, however, a solid foundation is required, and this can be laid on the ground unless there is liability to scour, or the firm ground underlies a soft stratum which must be removed; in either of the latter instances, the water must be temporarily excluded from the site of the foundation.—Artificial foundations may also be divided into ordinary foundations and foundations under water. Of the first kind we have two general cases: 1, when the ground is soft but not fluid; and 2, when it is of a semi-fluid nature. Soft ground may either be consolidated by driving piles into it until it becomes so compressed as to prevent the piles from sinking by the lateral friction produced; or a platform of fascines, timber, or concrete may be interposed between the surface of the ground and the superstructure, thus distributing the weight of the latter over a large extent of bearing surface. Artificial foundations under water form the most difficult class with which the engineer has to contend. If the ground be of tolerable firmness, it may be enclosed with a dam; but there is always danger of the bottom being lifted by the pressure of the water, and weighting the ground with planking and stones is generally resorted to as a preventive measure. If the ground is semi-fluid, the construction of a coffer dam is impossible, and the best mode of proceeding is to sink the work in large caissons, the bottom having been first covered with a bed of fascine work, weighted and sunk with stones or brickwork. This method is much used by the Dutch in their hydraulic works, and the fascine beds are often of large dimensions and several feet in thickness. The bundles of fascines cross each other at right angles, and are securely bound with tarred rope and strengthened with poles and wicker bands; after being weighted with gravel and broken stone, they are sunk when required by means of guide ropes, and afterward secured by long stakes and piles driven through them. (See Breakwater, Concrete, Dam (Coffer), and Pile).

FOUNDERY, a furnace with the requisite conveniences for melting and moulding cast iron or other metal upon a large scale. The special apparatus and operations belonging to them are described in the article Casting; to which a few further details of interest may here be added. Founderies are often conveniently placed near the blast furnaces in which iron ores are smelted; and from the products of pig iron furnished by these the particular qualities are selected for the second fusion, which is the special object of the foundery. But the business is commonly practised to better advantage in the vicinity of large iron markets, and in towns and cities where there is a constant demand for castings of every variety of form. To these places pig iron is brought from different sources and of all varieties, affording to the founder convenience of obtaining suitable mixtures for the kind of casting required. His supplies of fuel are also delivered with the greatest convenience and certainty, and his business is thus simplified and concentrated to the operations of the foundery itself. Some of the most extensive founderies in the United States are those employed in the manufacture of stoves, hollow ware, and other castings, in Albany and Troy, N. Y. In the former city nearly 200,000 stoves are annually produced. The manufacture of wheels for railroad cars is an especial branch of foundery operations, demanding the highest skill and judgment of the founder. This also is largely conducted at the cities named, as well as at many other places in the United States. Upon European roads wrought iron wheels alone are con-

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sidered safe, and are in general use; and it is only by the skill and ingenuity directed to this branch in the founderies of the United States, that cast iron wheels are brought to a degree of strength to admit of their being used with safety. These wheels essentially require the opposite qualities of lightness and strength; and to give the highest possible degree of each with the greatest hardness of periphery to resist wear has proved one of the nicest problems for the founder to solve. Distributing the metal unequally in order to secure lightness with sufficient strength involved danger of fracture by unequal shrinkage in cooling. This required especial provision, which was chiefly met by a suitable mixture of different qualities of pig iron. So nice an operation is it to obtain the different degrees of strength required in different parts, that at some of the works as many as 8 to 12 varieties of the best American charcoal-made iron are used in each wheel, and the selections are made with the utmost care. With each heating, tests of the strength are made, and remedies applied to correct any defects. The periphery of the wheel requires a quality of iron susceptible of acquiring the highest degree of hardness by the process of chilling, and yet retaining great strength. Between the periphery and the hub the best method of securing the greatest strength in proportion to the weight of metal is found to consist in making the web donble and of an undulating or corrugated form. The wheel is thus hollow, and is provided with holes for the escape of the air within, which would otherwise expand by the warmth derived from friction and burst the wheel. The capacity of some of the founderies engaged in this work is very large, a single establishment averaging the melting of over 40 tons of iron daily, and producing over 140 car wheels. Other foundery operations are referred to in the articles Bell and Cannon.

FOUNDLING HOSPITAL, a public institution for the reception and support of deserted children. The unwillingness or inability of some parents, especially of those of illegitimate children, to take care of their offspring, has led to the establishment of such institutions in many parts of the world. The nations of antiquity were notorious for their disregard of all promptings of humanity in the treatment of foundlings. Infanticide was punished by the ancient Egyptians, and the guilty parent was obliged to pass 3 whole days and nights in the embrace of the corpse of the deceased child, which was fastened to his neck. But in Athens and Rome infanticide was largely practised unchecked by law, and there is even reason to believe that in Rome the law commanded that deformed children should be put to death. Of the two crimes of infanticide and desertion, the latter was in most instances preferred as the less atrocious. It prevailed extensively in all the states of Greece except Thebes, where both child murder and the exposure of children were forbidden. At Athens children were commonly exposed in the gymnasium, called *cynosarges*, and in Rome at the *columna lactaria*, a pillar which stood in one of the public market places. The reception and education of foundlings was encouraged by the state by assigning them as property to those who took them under their protection, while those unprotected by private individuals were to be educated at the public expense. It appears that Athens and Rome had at an early period public institutions for that purpose, and the appellation of *βρεφοτροφιον* is believed to have had reference to that in the *cynosarges* of the former city, while Rome is supposed to have possessed an establishment of the same kind at the *columna lactaria*. But most foundlings were left at the mercy of those who found them. Suetonius, in his treatise *De Illustribus Grammaticis*, refers to Gnipho the rhetorician and Melissus the grammarian and comic poet as foundlings who were taken up by benevolent persons, and who achieved distinction. But generally foundlings were educated and treated as slaves, given in pawn, sold, and frequently mutilated for the purpose of enlisting the sympathies of the benevolent. This practice was even excused by Seneca, upon the ground that the children were slaves. The exposure of children became so common, that the classic historians speak with admiration of the nations who abstained from its practice. Strabo praises the Egyptians for their humane laws, and Elian the Thebans for their restrictive regulations on the subject; while Tacitus mentions as a circumstance deviating from the practice of the Romans, that the old Germans and the Jews considered infanticide as a crime. Endeavors to restrain the cruel practice of exposing children are said to have been made in the early days of Rome; Romulus is said to have prohibited the murder of sons and of first born daughters. But as the population increased and the public morals declined, those who had more children than they wished for exposed some of them. Ornaments and trinkets, more or less costly according to the circumstances of the parents, were deposited in many instances with the children, partly with a view of enticing people to take care of them, and partly for the purpose of facilitating the identification if at any future period the parents should be inclined to recover the children. Gibbon says: "The exposition of children was the prevailing and stubborn vice of antiquity; it was sometimes prescribed, often permitted, almost always practised with impunity by the nations who never entertained the Roman ideas of paternal power; and the dramatic poets, who appeal to the human heart, represent with indifference a popular custom which was palliated by the motives of economy and compassion. If the father could subdue his own feelings, he might escape, though not the censure, at least the chastisement of the laws; and the Roman empire was stained with the blood of infants, till such murders were included by Valentinian and his col-

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leagues in the letter and spirit of the Cornelian law. The lessons of jurisprudence had been insufficient to eradicate this inhuman practice, till their gentle influence was fortified by the terrors of capital punishment." The first Christian emperors did not venture to punish the exposure of children, but Constantine inflicted the pains of parricide upon fathers guilty of taking the life of their children, and called exposure also a kind of murder. He issued orders to deter parents from it, by depriving them of all hope of being able to recover the children even if they should pay the expenses incurred by those who had maintained them. He also decreed that parents who were too poor to educate their children should receive pecuniary assistance, but the practice of exposure was nevertheless continued for a long time after. Lactantius, a Christian father, who between 312 and 318 became tutor to Crispus, son of Constantine, describes the exposure of children as a still prevailing remnant of barbarism; and Julius Maternus Firmicus, a writer who lived under the reign of Constantine, gave particular instructions for casting the nativity of foundlings. The exposure of children was not completely prohibited till the time of Valentinian, Valens, and Gratian, in the latter part of the 4th century. The emperor Justinian passed a law in 529 which declared foundlings to be free, and forbade those by whom they were received and educated to treat them and detain them as slaves. The public institutions which existed for the reception of foundlings in Rome in the 6th century are called by Justinian *brephotrophia*, in imitation of the Greek institutions, but nothing is said about their regulation and organization. Establishments for foundlings are said to have existed in the 6th, 7th, or 8th century, at Treves in Germany, and in the 7th century in Anjou in France. The capitularies of Charlemagne refer to foundling hospitals as distinct institutions. In Milan an institution was founded about 787 by an arch-priest named Dathens in order to prevent infanticide. Of the prevalence of this crime he gives a very pathetic account in the letter of foundation, which has been published by Muratori. The mothers of children (mostly illegitimate) carried to this establishment strewed salt between the swaddling clothes, to denote that the infant had not been baptized. The foundlings (*jactati*) were suckled by hired nurses, supplied with the necessaries of life, taught some handicraft, and at the age of 7 they were discharged as free-born. This latter regulation was probably made by Datheus, to guard against the custom which then prevailed among the Franks, and also in other countries, according to which the foundlings became the property of those by whom they had been received and educated, unless they were demanded back by their parents within 10 days. In 1070 Oliver de la Trau founded at Montpellier a charitable order, the members of which called themselves *hospitalarii sancti spiritus*, and devoted themselves to the assistance of the poor, and of foundlings and orphans. A separate foundling hospital, under the name of hospital of the Holy Ghost, was founded in the city in 1180 by a zealous member of that order, the count Guy of Montpellier, which was sanctioned by Pope Innocent III. in 1198. During the 13th century foundling hospitals were established at Rome, and at Eimbeck (now belonging to Hmnover). The magnificent foundling hospital at Florence, called at present *spedale degli innocenti*, was founded in 1316; kindred institutions were established in Nuremberg in 1331, in Paris in 1362, and in Venice in 1380.—The great hospital of Santo Spirito in Rome, on the right bank of the Tiber, near St. Peter's, contains a foundling hospital capable of accommodating upward of 3,000 children. The number annually received is about 800; the mortality is about 57 per cent. in the hospital, but many of the children are sent out to the country to be nnrsed, among whom it is said to be still greater. There are several other foundling hospitals in Rome; the total number of foundlings is estimated at upward of 3,000 annually, the facilities for admission being so great that children are brought from all parts of the Papal States and from the neighboring Neapolitan provinces. Its revenue is about $50,000 per annum. At Naples, foundlings are chiefly accommodated at the hospital *della Annunziata*. There are in Naples annually about 2,000 foundlings, out of 15,000 births, and out of a population of about 400,000. Naples has the reputation of devoting more care to the education and welfare of foundlings than any other city of Italy. The number of foundlings in Tuscany is about 12,000 out of a population of about 1,800,000. A considerable number of the foundlings in Italy are supposed to be legitimate children, abandoned by their parents on account of poverty. About one in 16 of the children is claimed by the parents; the majority are cared for during infancy and childhood, either in the hospitals or among the neighboring peasantry, who supply them with board at a small remuneration. When of sufficient age they are dismissed to support themselves, but in many of the hospitals they have some claim in after life on occasions of distress or sickness. Many children carried to the foundling hospitals are accompanied by tokens. In the hospital *degl' innocenti* at Florence a piece of lead imprinted with a number is hung round the neck of each babe, in such a manner that it cannot be easily removed. By these means, and by other tokens, it is easy to obtain information, even at a late period, in regard to each child.—There are foundling hospitals in Cadiz, Barcelona, and other Spanish cities, and several in Madrid. The girls brought up in the foundling hospital at Barcelona were formerly led in procession when of marriageable age, and any one who took a fancy to one of them might indicate his choice by throwing a handkerchief on his favorite girl and marry her. The number of

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foundlings annually received in the principal hospital at Madrid is about 4,000. The hospital is chiefly served by sisters of charity. The infants are intrusted to nurses, and at the age of 7 they are transferred to the college of the *desamparados* (forsaken), where they receive instruction. Some are sent to an asylum, where they are drafted to learn practical handicrafts, and this asylum is in a great measure a self-supporting institution. A curious law exists in Spain by which every foundling is to be considered as belonging to the nobility, it being deemed less wrong to raise 100 plebeians to the rank of noblemen, than to degrade one single nobleman to the level of a plebeian. The total number of foundling hospitals in Spain is estimated at about 70, and the foundlings at about 13,000. In Portugal, where illegitimate births are much more numerous than in Spain, the number of foundlings is said to be very great. In the neighborhood of Oporto country women may be met conveying babies to the foundling hospital of that city, 4 or 5 together in a basket. They are the illegitimate children of peasant girls, who are forwarded by the authorities to the care of the hospital. The *santa casa de misericordia*, an immense charitable establishment of Lisbon, contains a foundling hospital; and there is another hospital at Belem, near Lisbon (the *real casapia*). These two hospitals receive together over 3,000 children annually, who are brought up for some trade or calling. Almost every town and village of Portugal has an establishment called *casa de misericordia* which takes care of foundlings. —Among the first hospitals which received and educated foundlings in France was the *Hôtel Dieu* of Lyons (1523). Francis I. founded a kindred institution in 1536. A few years afterward it became customary for sisters of charity to place foundlings at the entrance of the cathedral of Notre Dame of Paris, and to enlist the sympathies of the public by exclaiming: *Faites bien à ces pauvres enfants trouvés* ("Extend your charity to these poor foundlings"). They were accommodated in an asylum called *la couche* (the bed), at the expense of the dignitaries of the law and of the church. The metropolitan see, the monasteries, and chiefly the hospital of the Holy Ghost, were all called upon to contribute toward their support. The dispensation of this charity led however to grave abuses. The women hired to take care of the children traded with them. Some were sold for 20 sous each to sorcerers, who purchased them for use in their art; others to beggars, who paraded the children with a view of securing the alms of the benevolent. The asylum was transferred to another place, but the donations were not sufficient to support the institution. The children increased in numbers at a fearful rate. Lots were cast to decide which of the children should have the benefit of education, and those who drew blanks were entirely neglected. Many children lost their health or died from the deteriorated milk of sickly nurses. The children admitted into those asylums were almost all illegitimate or of unknown parents. A foundling hospital was established in 1563 in the hospital of the Holy Ghost, under the direction of the bishop of Paris, and managed by an association of priests. The children were well educated there, many of the boys for the priesthood, and many of the girls were married and provided with dowries. But this hospital (which was suppressed in 1670) refused to receive illegitimate children; yet they were the principal victims of misery, and their condition was such as we have above described when St. Vincent de Paul appeared. He pleaded with great fervor and eloquence the cause of the poor children, collected funds, and enlisting the sympathies of women, he established in 1640 a new institution for foundlings, with the assistance of the niece of the keeper of the seal, De Marillac, of Mlle. Legras, and other philanthropic ladies, and with the coöperation of the king and the court. During the life of Vincent de Paul it remained a private institution, under the zealous care of a committee of ladies. In 1670 the hospital was converted into a public institution by Louis XIV., and was transferred to the rue de Notre Dame. Revenues were assigned to it and taxes raised for its support, and the first president and procureur-general of the parliament placed at the head of its administration. Subsequently it was enlarged, and although similar institutions were founded in other great cities of France, at the charge of the feudal lords, about 2,000 foundlings came annually from the provinces to the capital. They were sent in such a reckless manner in crowded and ill-conditioned wagons that 9 or 10 children frequently died in one journey. The same inconvenience arose in Lyons, when the exportation of foundlings from the rural districts swelled the number from 500 to 600 at the beginning to 1,500 to 1,600 at the end of the 18th century. After the revolution of 1789 the republic assumed the guardianship of foundlings. The terrorists decreed (July 4, 1793) that they should be called *enfants de la patrie*, in compliment to their illegitimate mothers. In 1798, 11,000,000 francs were assigned toward their support. An imperial decree of Jan. 19, 1811, ordered the establishment of a foundling hospital in each arrondissement of France, to be governed by the following regulations. The children are suckled and weaned in the hospitals, and kept there until the age of 6, when they are placed under the charge of peasants and artisans, who receive a stipend for their board and training. This stipend is reduced from year to year until the children reach the age of 12, when the able-bodied boys are placed at the disposal of the minister of marine, while for those who are invalids some labor appropriate to their condition is provided in the hospital. They are the property of the state, and those who at the age of 12 have not been taken into the public service are immediately placed under apprenticeship by the administration of the hospital.

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The annual expenses for nursing and for the outdoor board of the children below the age of 12 amount to 7,000,000 francs, which are paid by the departments to which the children belong. The expenditure for clothing is from 1,500,000 to 1,800,000 francs, which is paid by the respective hospitals. The number of foundlings in France was, in 1784, 40,000; 1811, 69,000; 1819, 99,346; 1825, 117,305; 1830, 118,073; 1833, 129,699; 1845, 96,788; 1856, 120,000. These numbers include only children below the age of 12. After 12 the administration ceases to keep them under its control, but the foundlings between the ages of 12 and 21 are estimated at from 60,000 to 70,000. The proportion of foundlings to the population is 1 to 353, and to births 1 to 39. The annual number of foundlings and deserted children is from 25,000 to 30,000; $\frac{9}{10}$ are illegitimate and $\frac{1}{10}$ legitimate children. The annual number claimed by and restored to their parents is about 3,000, or about 1 in 9. The average life of the foundlings does not exceed 4 years. The extent of the mortality is appalling; it is 52 per cent. during the first year, and 78 per cent. from the first day to the 12th year of their existence, so that only 22 out of 100 foundlings who are born on the same day live to the age of 12, while in the community at large 50 out of 100 reach the age of 21. The convicts and prisoners of France comprise 13 per cent. of male foundlings, and $\frac{1}{4}$ of the inmates of houses of prostitution are female foundlings. Previous to 1811 the admission of children was public, and they were deposited in the hands of an officer of the institution; but the decree passed in that year imposed upon each arrondissement the obligation to establish a hospital of deposit for the reception of children who are deserted after their birth, and to provide it with a turning box in which the mother or any other person could deposit the child secretly. In accordance with that decree 256 hospitals were established provided with such boxes, and 17 without them. But many arrondissements removed the boxes and the hospitals of deposit, and the total number of such hospitals in the whole of France was in 1856 not above 141, of which only 65 were provided with turning boxes. There is still a hospital of deposit for each department, but in 38 departments they are unprovided with turning boxes. The suppression of the turning boxes proceeded from the conviction that the great increase of foundlings since 1811 was due to their use, but a series of letters by M. Ulysse Ladet appeared in the *Gazette des tribunaux* in 1852 in favor of their restoration; and there are still many who think that, by insuring secrecy in depositing children, they are powerful preventives of infanticide, while their opponents look upon them as an encouragement for unnatural parents to discard their children, and prefer the restraint imposed by the publicity connected with the deposition of the child into the hands of an officer. The statistics of infanticide, however, are rather favorable to the influence of the turning boxes; but the question of their preservation or suppression depends upon many other considerations beside that of infanticide, and continues to be a subject of anxious investigation in France. This much is certain, that the extraordinary facility afforded by the law of 1811 for disposing of children produced a singular increase in the number of foundlings. So great was the effect of the law upon the people that it was not uncommon to hear parents exclaim at the least inconvenience which may have been produced by one of their children: *Je te mettrai aux enfants trouvés.* It was also discovered that parents put themselves in collusion with those appointed by the hospital to nurse the children or to supply them with board, and it was ascertained that there existed mothers who, after having discarded their own offspring by secretly depositing them in the turning boxes of the hospitals, afterward managed to officiate as nurses of the institution. In addition to the money saved by throwing the support of the child upon the hospital, the mother thus made gain from her own shame. Another source of evil was the placing of foundlings in the houses of peasants and artisans in the vicinity of their parents, and the children have been taken away from such dangerous neighborhood; but this has given rise to serious remonstrances on account of the cruelty of separating the poor creatures from those who, by their ministrations, have enlisted their affections. Since 1838, however, the policy of the suppression of hospitals and turning boxes in the provinces, and the displacement of children, has been favored by the government, but the discussions on the subject are far from being exhausted. The number of children admitted into the foundling hospital of Paris in 1852 was 2,303; 1853, 2,380; 1854, 3,441; 1855, 3,700; 1856, 3,943. The small numbers of 1852 and 1853 were exceptional, and owing to the measures adopted in the former year by the administration to check the abuses in abandoning children. Of those admitted in 1856 only 674 were supposed to have been legitimate; only 551 were born in the department of the Seine, and 282 were foreigners. There is also a provisional depot in the hospital for the reception of children whose parents are sick or in prison. Of 1,890 children admitted to the depot in 1856, 249 died in the same year, and 377 were transferred to the hospital in consequence of the death of their parents or guardians, or their inability or unwillingness to support them.—Previous to the separation of Belgium from Holland there were in both countries 19 hospitals (2 in Holland, and 17 in Belgium), and in 1826 they contained 13,220 foundlings, against 10,739 in 1815. The cost of maintaining these hospitals was $350,000, or about $27 for each foundling. The total number of children annually abandoned in Belgium is estimated in 1859 to exceed 8,000 out of 148,000 births, or about 1 in 18. The average expense attendant upon each infant is about $14. Foundling hospitals are very numerous in

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Belgium. The turning boxes in which, as in France, children were secretly deposited, have been declared illegal since 1834. The most important foundling hospital of Holland is that of Amsterdam, where about 3,000 children are received annually.—In Germany foundling hospitals are considered to exert an unfavorable influence upon morality, and many of them have been abolished. The foundling hospital of Vienna, founded by Joseph II. in 1784, is an admirable institution, and contains a lying-in hospital. There are similar institutions in the other principal cities of the Austrian empire, but in the German states the system of foundling hospitals has been gradually abandoned. There are children's aid societies, orphan asylums, and other charitable institutions, where children whom their parents are unable to support are educated at the expense of the government or of private charitable foundations. But foundling hospitals were considered in Germany to have saddled the people with taxes which ought to have been borne exclusively by the parents, and at the same time to have increased the temptation to licentiousness. On the other hand, however, it is maintained that the abolition of foundling hospitals tends to increase infanticide and abortion.—Toward the end of the 17th century proposals for a foundling hospital were made in London. Addison was among those who wrote in favor of its establishment (in the "Guardian" in 1713). It was founded in 1739, chiefly through the exertions and at the expense of Capt. Thomas Coram. Coram's full-length portrait, painted by Hogarth, is in the chapel of the hospital; and the great painter said: "The portrait I painted with the most pleasure, and in which I particularly wished to excel, was that of Capt. Coram for the foundling hospital." Coram's statue was also placed there in 1856. Handel the composer was one of the principal benefactors of the hospital. He presented it with an organ and gave several performances for its benefit, and performed his great oratorio of the "Messiah" for the first time in the chapel (May 1, 1753), and frequently repeated it there afterward. The hospital was opened June 2, 1756, and adapted to maintain and educate 500 children. But the great influx of children, the large mortality among them (in the foundling hospital of Dublin the mortality was still greater), and the abuses consequent upon the facility of admission, led to a modification of the institution; since 1760 it has ceased to be a receptacle for foundlings, and was then changed to what it now is (1859), a hospital for poor illegitimate children whose mothers are known.—In Stockholm, where public prostitution is prohibited, there are nearly 50 illegitimate children out of every hundred children born, and in the interior of Sweden one out of nearly 11. Hence there is a great number of children to be provided for in the numerous foundling hospitals of Sweden. The *Stora Barnhorst* hospital of Stockholm, originally established by Gustavus Adolphus for the children of military men, is now used as an asylum for infants, who are received without any questions being asked about their parents. It is not different from the ordinary foundling hospitals of Stockholm, except that an entrance fee of about $35 has to be paid for every child. This institution is in a flourishing condition, and has an income of over $150,000 per annum. Many parents who are fully able to maintain their children, send them to this hospital in order to be relieved from the care attending their training and education. There are foundling hospitals in Christiania and other Norwegian cities, but the number of foundlings is not as great in Norway as in Sweden. It is true that in the 4 years preceding 1855 every 10th child born in the whole country was illegitimate; but this large proportion is in a great measure due to the long time which elapses between the betrothal and the marriage of the parents, many of whom eventually secure the legitimacy and take care of their children.—The foundling hospital of Moscow (*Vospitatelnoi Dom*) was founded by Catharine II. in 1762. It is an immense establishment, which has been enlarged by a member of the Demidoff family, who contributed largely to its support. A lying-in hospital and schools are connected with the institution, and the entire number of its inmates is upward of 25,000. The upper part of the building is appropriated to the infants, of whom there are always about 600, with the same number of wet nurses, who are dressed in a uniform of dark cotton gowns and white aprons, and the peculiar cap worn by nurses in Russia. The girls are separated from the boys. About 5,000 children are sometimes in the villages in the environs, the peasant women receiving 5 rubles a week for suckling and taking care of a child. The inhabitants of a large village near Moscow are entirely devoted to the bringing up of the foundlings. All children are received, whether foundlings or not, on condition that they are given up to the state. In 1857, 14,000 children were received, and from 1762 to 1858, 390,000, including 60,000 born in the lying-in hospital. In June, 1858, there were 1,200 orphan children of officers in the institution. The payment of $25 by the parent entitles the child to be brought up exclusively within the walls of the institution; one of $200 procures for a boy the rank of an officer. Beside becoming soldiers and mechanics, the government has of late years established many of them as farmers and colonists on the crown lands. Many of the best Russian engineers have been educated in the institution. Those who display great abilities are sent to the university, and some of them become physicians. The majority of the girls are employed in manual labor, the proceeds of which go partly to the treasury of the institution, and are partly saved for them to form their marriage portion; but those of superior ability find opportunities for cultivating it, and may become musicians, actresses, governesses, teachers, &c. All, without refer-

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ence to age or sex, can return to the hospital should they fall into distress in after life. The mortality among the children is abont 60 per cent.; the expenses amount to nearly $5,000,000 annually, which are defrayed by the government. The *Vospitatelnoi Dom* in St. Petersburg was founded by Catharine II. in 1772, as a branch of that of Moscow, but it now eclipses the parent institution. The small original endowment of Catharine has been increased by private donations and by large gifts of the successive czars, and the hospital is now one of the wealthiest landed proprietors in Russia. Alexander I. conferred npon it the monopoly of cards and the revenues of the Lombard bank. The annual revennes of the hospital are now estimated at $4,500,000, and the expenditures at abont $3,800,000. It has been so much enlarged that it forms now a little district of its own, near the Fontanka canal, in the best part of St. Petersburg, covering 28 acres of grnond. In immediate connection with it is a lying-in hospital. The staff of nurses is generally from 600 to 700; upward of 500 teachers are employed, beside a staff of physicians, cooks, housekeepers, &c.; the total number of nurses, servants, and other employees being rarely less than 6,000. The education of the children costs $1,000,000 annually. In 1790 it contained only 300 children, and in 1837 abont 25,000; the annual receipt of children is now about 7,000. The only question asked on their arrival is if the child has been baptized, and by what name. If not baptized, the ceremony is performed by a priest, and the mother receives a ticket, the duplicate of which is placed arnnnd the child's neck. The mortality is greater than in Moscow, which is accounted for by the inferior vigor of the nurses who come from the vicinity of the capital. A grent many children die on the way to St. Petersbnrg, some being brought 1,000 miles, from Siberia and Bessarabia. Some die immediately after their arrival, and others during the tedious ceremony of baptism, which lasts several hours. Four or five deaths occur daily in the hospital, or abont 3,000 annnally among those in the asylum and those out at nurse. About 50,000 children have been already deposited in the cemetery of Okhta, a section of which is set apart for the foundlings. It is said that not only St. Petersbnrg and the immediate vicinity, but one-half of Russia sends its surplus of infantine population to this institution, and the other half to that of Moscow. Upward of 25,000 foundlings are constantly enrolled in the books of the St. Petersbnrg hospital. The children are given in care of wet nnrses for about 6 weeks, when they are sent into the conntry until they are 6 years old. They are then brought back to the institution and educated, the schools of the St. Petersburg hospital being superior to those of Moscow. Many of the girls qualify themselves as governesses in Russian families, and the boys as artisans in imperial mannfactories; or, as in Moscow, they receive, in cases of special capacity, a scientific, literary, or musical education. In the lying-in-hospital connected with the institntion pregnant women may enter a few weeks before their confinement, and the strictest secrecy is maintained. Among the foundlings are many of legitimate birth. The number of illegitimate children is rather small in St. Petersburg compared to some other large cities. In the hospital itself the strictest morality prevails; and on one occasion, when one of the inmates gave birth to an illegitimate child, the late emperor Nicholas is said to have threatened to disgrace the whole body. The empress of Rnssia is called the mother of the foundlings. Stringent laws have been passed since 1837, by which the foundlings become the property of the government, and the hospitals in St. Petersburg and Moscow furnish a constant supply of recruits for the army or navy. These establishments are admirably managed; but those in the interior of Rnssia are very bad, and the government does not seem inclined to favor the establishment of new foundling hospitals in the provinces. The property devoted to the support, maintenance, and education of foundlings in Russia is said to amount to $500,000,000. Infanticide and abortion are almost unknown in that conntry.—In China, infanticide is practised throughout the empire, and in some provinces there are from 500 to 600 children killed per month. The nnmber of illegitimate children is immense, although the laws punish illicit intercourse with from 70 to 100 strokes of the bamboo. A foundling hospital has been established at Canton in the hope of preventing infanticide, but only abont 500 children, a very small proportion of the births, are deposited there annually.—One of the most important charitable institutions of the city of Mexico is the *cuna* or foundling hospital, in which there are usually from 500 to 600 children. It is snpported by private individuals, the most influential citizens contribnting the funds, and the Mexican ladies their time and attention. When a child has been abont a month in the hospital, it is sent with an Indian nurse to one of the neighboring villages. These nurses are subject to a responsible person who is a resident of the village and guarantees their good conduct. The mothers of the children often officiate as nurses, and are paid for their services. When weaned the child is brought back to the hospital, but generally the children are adopted by respectable persons, who bring them up either as servants or as their own children.—In the foundling hospital of Rio de Janeiro, the boys, who are brought np in the neighboring establishment at Botofoga, are in due time apprenticed to trades, and the girls are educated in the city establishment. At each anniversary persons in want of wives attend, and any one who wishes to marry one of the girls, and whose proposals are accepted, applies to the managers of the hospital, who inqnire into the character of the applicant. If it proves satisfactory, the marriage is permitted, and a small dowry is given from the funds of the hospital.—In the United States the

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establishment of foundling hospitals has been frequently proposed and discussed in different places; but the public sentiment seems as yet to be decidedly averse to it, and foundlings are generally provided for in common with other objects of public and private charity.

FOUNTAIN, a W. co. of Ind., bounded W. by the Wabash river, and drained by Coal and other creeks; area, about 400 sq. m.; pop. in 1850, 13,253. It has a level surface, about ¼ of which is occupied by fine prairie land, while much of the remainder is covered with thick forests. The soil consists chiefly of a rich black loam, well adapted to wheat and other grain. The productions in 1850 amounted to 927,278 bushels of Indian corn, 60,031 of wheat, 53,480 of oats, and 7,554 tons of hay. There were 26 churches, 1 newspaper office, and 3,662 pupils attending public schools. Coal and iron are obtained in large quantities. Capital, Covington.

FOUQUÉ. I. Heinrich August de la Motte, baron, a Prussian general, born at the Hague in 1698, died in Prussia, May 2, 1774. He was descended from an ancient Norman family which had fled on account of religious persecution to the Netherlands. While stationed at Küstrin he became acquainted with the crown prince, the future Frederic the Great, who was in prison there, and he possessed the confidence of that monarch until his death. Carlyle describes him as "a ready-witted, hot-tempered, highly estimable man." His memoirs (2 vols., Berlin, 1788, in French and German) contain his correspondence with Frederic, and his biography was prepared by his grandson (Berlin, 1824). II. Friedrich Heinrich Karl de la Motte, baron, grandson of the preceding, a German novelist and poet, born in the town of Brandenburg, Feb. 12, 1777, died in Berlin, Jan. 23, 1843. He was in arms in defence of his country in early youth, and again in 1813 in the war against Napoleon, was wounded at Kulm, and present at Leipsic. His delicate constitution unfitting him for permanent military service, he tendered his resignation soon afterward. Devoting himself henceforward to literature, he became one of the most original and fertile writers of the romantic school. An enthusiastic love for the ideal Christian chivalry of the middle ages, and for the ancient national poetry of Scandinavia and Germany, pervades most of his works; and his worship of the past was carried to such an excess in some of his later writings, that he was supposed to favor the perpetuation of feudal institutions, especially as during a few years previous to his death he edited in concert with Alvensleben the *Zeitung für den deutschen Adel* ("Journal for the German Nobility"). One of his most charming northern tales, "Sintram and his Companions," was suggested to him by Albert Dürer's engraving of the "Knight, Death, and Satan." One of his other tales, *Vial-Genie*, or *Mandrake*, is in Menzel's opinion one of the best elaborations of the old national legends. The work, however, by which he most endeared himself to American and English readers is *Undine*. Coleridge's admiration for this romance was unbounded. He said there was something in *Undine* even beyond Scott; that it was one and single in projection, and had presented to his imagination what Scott had never done, an absolutely new idea. Menzel says that *Undine* will always continue one of the most delightful creations of German fiction. A French translation of *Undine* appeared in Paris in 1817. An English translation by the Rev. Thomas Tracy of Newburyport, from the 4th German edition (Berlin, 1834), was published in Boston. Most of the other romances and tales of Fouqué have been translated and published in England. The following are the titles of the English translations: "Aslauga's Knight," the "Magic Ring," "Ministrel Love," "Thiodolf the Icelander," "The Two Captains," and "Wild Love." The shorter tales are collected under the title of "Romantic Fiction." Several of these translations have been republished in America. A corrected edition of his select works was prepared by Fouqué before his death (12 vols., Halle, 1841).

FOUQUET, or Foucquet, Nicolas, marquis of Belle-Isle, a French minister of finance, born in Paris in 1615, died March 23, 1680. He entered the public service at an early age, became procurator general of the parliament of Paris in 1650, and was devoted to the interests of Anne of Austria and of Mazarin, by whose influence he was made superintendent of finances. After the death of Mazarin (1661) he was supplanted by Colbert, who had revealed to the king the alarming condition of affairs. Fouquet had already awakened the distrust of Mazarin by his boundless ambition and by his reckless prodigality. His chateau of Vaux cost 18,000,000 francs, equivalent to double that amount at the present day. Fouquet was a man of brilliant parts. Pélisson was his secretary, and his chateau, which eclipsed in splendor the abodes of royalty, was a resort of the most distinguished men and women of the age. Molière and La Fontaine were the poets of this enchanted circle, and on the occasion of a fête which he injudiciously gave in honor of the king (Aug. 17, 1661), Molière's comedy of *Les fâcheux* was performed for the first time. This fête cost about 1,000,000 francs, and surpassed in display any public entertainment ever before given in France. The king was anything but flattered at seeing his own palaces and entertainments eclipsed by those of his minister, and his ill feeling against Fouquet was increased by the latter's supposed ambition to rival his master in the affections of Mlle. de la Vallière. On Sept. 5, 1661, he was arrested, and prosecuted for malversation. His trial lasted 3 years. Among his papers were found instructions to his family, apparently given with a view of overthrowing Mazarin, but which were alleged against him as incitements to rebellion. He was also charged with enlarging the fortifications of his establishment of Belle-Isle, with the same treasonable

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intentions. He was convicted of peculation and of treason, Dec. 20, 1664. Of 22 judges, 9 voted for his death and 13 for banishment for life. To send into exile to foreign countries a minister who knew so much of the secret affairs of France as Fouquet did seemed dangerous to the king, who consequently commuted the sentence to perpetual imprisonment. After his arrest he had been successively detained at the castle of Angers, at Amboise, at Vincennes, at Moret, and at the Bastile, where his secretary Pélisson was also imprisoned, while his wife and children were removed to Limoges. He was now (Dec. 23, 1664) transferred to the castle of Pignerol, and put in charge of Saint Mars, the future gaoler of Lauzun and of the man with the iron mask. He was treated with great rigor until toward the end of his life, when he was permitted to see his wife and children. The progress of his trial and his death are feelingly referred to in Madame de Sévigné's letters. This distinguished lady, as well as Mlle. de Scudéry, La Fontaine, Saint-Évremond, and many other eminent persons, had in vain asked for his liberation. Although strictly watched, Fouquet contrived to write considerably while in prison, and several works, chiefly on religious subjects, are attributed to him. The documents referring to his trial were published in Holland in 1665–'67 in 15 vols., and a 2d edition in 16 vols., under the title of *Œuvres de M. Fouquet*, in 1696. He had 5 brothers, 3 of whom were priests of high rank, and 6 sisters, all nuns.

FOUQUIER-TINVILLE, Antoine Quentin, a French terrorist, born in Héronel, near Saint Quentin, in 1747, guillotined in Paris, May 8, 1795. He studied law in Paris, was for a time procurator at the Châtelet, which place he lost by his misconduct, and afterward obtained that of police clerk. Ruined by vices, and harassed by debts, he threw himself among the most violent democrats during the first troubles of the revolution, became an agent for the police, and after the establishment of the revolutionary tribunal, March 10, 1793, was advanced to the post of public accuser before it. From that time till July 28, 1794, he was the indefatigable purveyor of the guillotine. Without talent, and with a coldly sanguinary nature, he was a proper man to execute the purposes of the terrorists. Impassible as the law, indifferent to friends and enemies, with equal remorselessness he sent to death Bailly and Danton, Vergniaud and Hébert, Marie Antoinette and Robespierre. Soon after the fall of Robespierre the convention brought him to judgment, and he was condemned and executed with 15 other agents of revolutionary justice.

FOURCROY, Antoine François, count, a French chemist, born in Paris, Jan. 15, 1755, died there, Dec. 16, 1809. The son of a druggist in reduced circumstances, he tried to gain a living by several callings, but finally, in 1775, became a student of medicine. In 1777 he published a translation of Ramazzini's Latin "Treatise on the Diseases of Mechanics," with notes and additions. In 1780 he delivered a course of popular lectures on chemistry and natural history, which attracted a large auditory, and were published in 1781. In 1784 he was appointed professor of chemistry at the king's garden, now *jardin des plantes*, for which post he had been, in preference to Berthollet, designated by Buffon. He had been previously admitted to the scientific meetings held at Lavoisier's, took part in the discussions on systematizing chemistry, and was one of the editors of the *Méthode de nomenclature chimique*, which appeared in 1787, and marked a new era in the progress of that science. He meanwhile published many papers upon chemistry, and enlarged and improved his lectures. In 1792 he was elected assistant deputy to the convention, and for 18 months devoted his whole time and energy to extracting and purifying saltpetre, which was then much needed in France for the manufacture of gunpowder. During the reign of terror, Desault, Chaptal, and Darcet were indebted to him for their safety; but all his exertions were powerless to save Lavoisier. After the 9th Thermidor, being appointed a member of the committee of public safety, he endeavored to improve the system of public education; he organized the polytechnic school, caused the establishment of three schools of medicine, and suggested the idea of the normal school. On the adjournment of the convention he was elected to the council of ancients, resumed his public discourses on science, remodelled his lectures, which, under the title of *Système des connaissances chimiques, et de leur application aux phénomènes de la nature et de l'art* (6 vols. 4to. or 11 vols. 8vo., Paris, 1801), became "the greatest monument erected to chemical science in the 18th century." Bonaparte appointed him director-general of public instruction; under his care the public schools flourished, and no fewer than 300 colleges or lyceums were established. The organization of the new university of France was devised by him, and he expected to be appointed grand master; but Napoleon gave the place to Fontanes. This preyed seriously upon his mind, and hastened his death. Beside the works mentioned above, he left: *La médecine éclairée par les sciences physiques* (4 vols. 8vo., 1791), *La philosophie chimique* (8vo., 1792, reprinted in 1795 and 1806), *Tableaux synoptiques de chimie* (atlas folio, 1805), and many scientific papers in the *Mémoires de l'académie des sciences* and other learned collections.

FOURIER, François Marie Charles, a French writer on social science, born in Besançon, April 7, 1772, died in Paris, Oct. 10, 1837. His father was a woollen draper, and he was the youngest of 4 children, the others all being daughters. From his earliest infancy he manifested a singular originality and force of character. When only 5 years of age he was flogged for telling the truth about some article in his father's shop, and from that time, as he says, his mind was alive to the conventional falsehoods of

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trade. He began to speculate almost as soon as he could think on the subject of reforming the processes of commerce. At school he was diligent and quick to learn. The prizes for French themes and Latin verse are assigned to him in the records of the town school for the year 1785. But his favorite early studies were geography, botany, and music. His pocket money he used to spend in buying globes and charts, and much of his leisure time he devoted to the cultivation of flowers. He was sufficiently master of music to be enabled to construct a new musical notation, which, however, has never come into general use. On leaving school he was sent to Lyons, where he entered as clerk in a commercial house. He was then about 18 years of age, and, having a vehement desire to travel and see the world, he engaged soon after as travelling agent with a highly respectable house, whose business connections extended over France, Germany, Switzerland, Holland, and Belgium. This gave him the opportunities for observation which he desired. In 1793, having received about $20,000 as his share of his father's property, he began business for himself in Lyons, embarking his whole fortune in colonial produce, which he purchased at Marseilles, and expected to sell at the former city. But just then the troops of the convention occupied Lyons, and pillaged the inhabitants, taking the greater part of Fourier's small fortune. The Lyonnese rose against the revolutionists, and Fourier joined them, but the insurrection was promptly suppressed, though not without a fearful slaughter. Fourier was cast into prison for 5 days, hourly expecting to be led out to the guillotine, and only escaped by some accident, of which we know nothing. Flying to Besançon, his native place, he was again incarcerated as a suspicious person. By joining a troop of the revolutionary army, however, he was enabled to exchange the cell for the saddle, and as a *chasseur à cheval*, a light dragoon, he served nearly two years in the army of the Rhine. He obtained his discharge on account of ill health, Jan. 24, 1795. During his connection with the army he made important military suggestions to the government, for which he received its thanks through Carnot. Subsequently also he attracted the attention of Napoleon by a striking political essay put forth in a local journal. On acquiring his liberty again, he resumed his commercial pursuits, but his mind was then mainly absorbed by his speculations on the possibility of correcting the methods of industry. In 1799, while employed as a clerk in a wholesale warehouse at Marseilles, he discovered what he called the universal laws of attraction, and of the essential destiny of humanity upon earth. He spent many years in elaborating these discoveries; his first work, called *Théorie des quatre mouvements et des destinées générales*, was not published till 1808; but France being then agitated by the projects of Napoleon, no attention was given to it, although it was one of the most daring flights of the scientific imagination that had ever appeared. It was not till 1814, when a copy of this book fell into the hands of Just-Muiron, an enthusiastic and benevolent gentleman of Besançon, that it had made a single convert. As it bore the imprint of Leipsic, without the name or address of the author, it was a long time before he was able to find out Fourier, who then resided at Belley. Just-Muiron afterward assisted him in the preparation and publication of other works. In 1822 was issued a *Traité de l'association domestique agricole* (2 vols. 8vo.), which in its latest form appeared under the more imposing title of *Traité de l'unité universelle*, and was the great work of his life. As originally conceived by the audacious mind of the author, it was meant to embrace 9 volumes, in the following order: 1, the abstract principles of passional attraction, and their partial application to industrial associations; 2, familiar synthesis of the principles of attraction, and their equilibrium in practice; 3, the analysis of man's physical, moral, and mental nature, individually and collectively, with regard to individual society and universal unity; 4, methodical synthesis and transcendental theory; 5, commercial duplicity and ruinous competition; 6, the false development of human nature, and a regular analysis and synthesis of a false development of universal nature, as an exception to universal harmony; 7, universal analogy and illustrations to cosmogony; 8, the scientific theory of the immortality of the soul; and 9, dictionary of contents and references to the whole work. Two volumes only were printed, however, at Paris, and these not a solitary critic or review noticed. Fourier drew up a brief summary of their contents, in the hope of getting them into notice in that way. But no one spoke. The truth was, that the subject was so novel and was treated in so original a manner, that no ordinary critic felt able to speak. Fourier's system had been the labor of his life, and it required the most patient and careful study in order to be comprehended. He sent his work to many of the leading statesmen of the times, with the same results. No one was ready or willing to lend him a helping hand. Disappointed and disgusted, Fourier returned to Lyons in 1825, where he accepted a cashiership in a commercial house, at a salary of 1,200 francs, or about $250, a year. In 1826 he went to Paris again to prepare a compendium of his great work, which however was not published till 1829, under the name of the *Nouveau monde industriel et sociétaire* (1 vol. 8vo.). This was a far more attractive, clear, and judicious statement of his views than any that he had yet given, but it was received with the same indifference by the press. In 1831, when the St. Simonians began to make a stir in France, Fourier sent forth a bitter pamphlet against them and the followers of Robert Owen, accusing them of utter ignorance of social science, and of gross charlatanry in their pretensions; and from that time his extraordinary writings began to receive the attention of minds inclined

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to such studies. Madame Clarisse Vigoreaux was one of his first disciples, and by her earnest and poetic work, entitled *Paroles de Providence*, written in imitation of Lamennais' *Paroles d'un croyant*, excited a vivid interest in the subject. Many of the ardent disciples of St. Simon, seeing the more precise and scientific nature of Fourier's socialism, abandoned their old master for this new teacher. On June 1, 1832, a journal of the socialistic doctrines of Fourier was begun under the name of *Le phalanstère*. It was continued for only two years, although it laid the foundation of the Fourieristic propaganda. About the same time a practical attempt to realize the doctrines was made at Coudé-sur-Vesgre, near Rambouillet, but somewhat against the will of Fourier, who saw that the capital was insufficient for the enterprise. In 1835 Fourier published another work, called *La fausse industrie, morcelée, répugnante, et mensongère, et l'antidote, l'industrie naturelle, combinée, attrayante, véridique, donnant quadruple produit* (1 vol. 8vo.); but it added nothing to his original discoveries. The next year his friends commenced a monthly, under the name of *La phalange*, which was vigorously conducted; and when the subject had created an audience for itself, a daily paper, *La démocratie pacifique*, was established, under the editorship of M. Victor Considérant. This maintained the propagation till it was discontinued during the reactionary movements which followed the revolution of 1848.—Fourier died in 1837, but his doctrines had then obtained some vogue in France, where a school was regularly organized for their diffusion. At the head of it were Considérant, Cantagrel, Victor Hennequin, Laverdaut, Victor Meunier, and others, ardent young men, who devoted their lives in the spirit of missionaries to what they supposed to be the reformation of the world. In England, Hugh Doherty placed himself at the head of the movement; a large weekly paper called the "Phalanx" was set on foot by him, and ably sustained; while in the United States Mr. Albert Brisbane, by his vehement expositions of the subject, gave to it an immense éclat and temporary success. Not a few of the earnest and intellectual young men of the country accepted the new doctrine as the veritable gospel of social reform; but of late years it has died out of the public mind. Nevertheless, the scheme of Fourier, as the most comprehensive, consistent, bold, and remarkable of the kind that was ever broached, and as having influenced so largely the current of thought in Europe and America, deserves more than a passing notice from the philosopher and the philanthropist. He was a man of the noblest humane impulses, of rare acuteness and sagacity of vision, and of profound as well as most original imagination. His negative criticisms of the disorders, the falsehoods, and the miseries of society, are a fearful laying bare of the ulcers of our imperfect civilization; and even they who may be inclined to reject his more positive notions as whimsical and dreamy, will find abundant material for thought in these exposures. The fundamental and leading principles of Fourier are summed up in the following short formulas: "1. The series distributes the harmonies of the world. 2. Attractions are proportional to destinies. 3. Analogy is universal." In other words: 1, all the harmonies of the universe grow out of a regular and uniform order, which Fourier denominated the law of the series; 2, all beings are led to and kept in their true sphere, not by a principle of external force, but of internal attraction; and finally, 3, the universe being everywhere the same, constructed upon the same infinite model, and according to the same eternal laws, must in every sphere repeat itself, or be analogous. These general principles or deductions Fourier carried out into all branches of science, but his chief application of them was to social science. Society being composed of men, he began with an analysis of human nature, of human impulses and attractions. The permanent principles of nature were three: the active principle, or spirit; the passive principle, or matter; and the neutral principle, or the mathematical laws of justice and harmony. The nature of man was coördinate with this division, and contained: 1, his physical nature, adapted to the passive principle, or matter; 2, his moral nature, adapted to the active principle, or spirit; and 3, his intellectual nature, adapted to the neutral principles of law and justice. The common object of all his physical desires is sensuous enjoyment; the common object of his moral, mutual affection; the common object of his intellectual, order and association; while over all presides a superior tendency to unity, or universal harmony. The essential faculties of the soul, then, or impulses to action or life, Fourier analyzed into 5 sensuous "passions," 4 moral passions, and 3 intellectual passions. Thus:

Sensuous faculties, or modes of enjoyment.	1. Sight, or desire for enjoyments of color, &c.
	2. Hearing, or desire for the pleasures of sound.
	3. Taste, or desire for delights of the palate.
	4. Smell, or desire for agreeable odors.
	5. Touch, or desire for external ease, &c.
Moral affections.	6. Friendship, or the affection of equals.
	7. Love, or the affection of the sexes.
	8. Paternity, or the family affection.
	9. Ambition, or the affection of society.
Intellectual impulses.	10. Cabalistic or emulative impulse.
	11. Alternating or varying impulse.
	12. Composite or combining impulse.
	13. Unitrism, or harmonizing aspiration.

These simple and essential desires of the soul, according to Fourier, may all be directed into a contrary and subversive development, by the unnatural action of circumstances. In the false conditions of society they become so many uncontrollable and warring appetites. What they want for their rectification and true development is a social sphere adapted to their harmonic action. Society must be constituted according to the same law of groups and series which harmonizes universal nature. The association of the 3 principal agents of production, that is, of capital, science,

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and labor, for the mutual advantage of each member of such association, in the several branches of agriculture, manufacture, commerce, domestic industry, art, science, and education, would prepare the way for this true society. The economies effected in expenditure and consumption would be prodigious; the distribution of labor and of its result would become gradually very exact and equitable; the pleasures of combined and varied exertion would take from toil its monotony and its repulsive aspects; while the skill, the wisdom, the grace of every member of the association would be always available to the benefit of every other member. The unity of the association would be expressed in the common domain and combined dwelling house; the variety, in the separate apartments, the different labors, the individual tastes. A township of about 1,800 persons, male and female, Fourier regarded as the original germ of larger combinations, which would interweave and unite themselves together, step by step, until a network of connected associations, bound by the same principles, and governed by a syndic or council of representatives, would be spread over a state, a nation, Europe, the globe. But this grand and world-embracing harmony would be the result of no instantaneous or speedy change, but of a regular development of the combined order, according to the law of the series. Society, he said, passed through a process of regular growth, from its most infantile condition to its highest maturity, when it would again begin to decline, and finally fall into decrepitude and decay. In this it resembled the growth of the individual man, who had his ascending vibration, or advance from infancy to youth, from youth to manhood, from manhood to old age, and then by a descending vibration from old age to death. This universal career of humanity Fourier distributed in the following order: two phases of incoherence, containing each 7 social periods; two phases of combination, containing each 9 social periods; grand total of 32 social periods or societies. The first 7 of these periods, embracing the history and progress of the world up to the present time, he named: 1, Edenism; 2, savagery; 3, patriarchalism; 4, barbarism; 5, civilization; 6, guaranteeism; and 7, simple association. Five of them, as the records of all the earth prove, have been periods of constraint, poverty, oppression, fraud, carnage, and false science; the other two are the feeble dawns of a better day, ushered in by associations of joint interest and reciprocal guarantee. But as soon as society shall have reached them, a higher and composite order begins, when 7 other periods, distinguished by successive creations of harmonic beings, will give happiness to all the world. Then comes the plenitude and apogee of harmony, the pivotal or amphiharmonic age of the race, which nature will recognize by the conversion of the aurora borealis into a boreal crown, encircling the earth as the splendid ring of Saturn encircles that planet, the stationary position of the ecliptic, and the disinfection and perfumery of all the waters of the seas, by means of the boreal fluid. This supreme condition of nature and man will continue for about 8,000 years, when the beam of happiness will again descend, and society pass through a series of declines, similar to the series of its advances. The earth itself will be smitten with a palsy of weakness, and after many convulsions, sink into final death. The human race, however, will not perish, but by a series of bicomposite transmigrations, attain to immortality in other spheres. Fourier was rigidly true to his method in all departments of inquiry, and applied it with the most intrepid and unhesitating fidelity, whatever the conclusions to which it might lead. His cosmogonical and ultramundane speculations therefore assume often the most bizarre and grotesque forms, and seem like the conjectures of a lunatic; and yet his thoughtful disciples find so much beauty in his social scheme, that they endure his aberrations for the sake of the comprehensive ideas which he suggests.—His collected works (3d ed., 6 vols., Paris, 1841 '45) do not include all his writings. Some transcendental speculations have since been published separately; others still remain in MSS.

FOURIER, Jean Baptiste Joseph, baron, a French mathematician, born in Auxerre, March 21, 1768, died in Paris, May 16, 1830. In 1789 he was appointed professor of mathematics at Auxerre. He took an active but moderate part in the first movements of the revolution at Auxerre, was twice imprisoned there and once at Paris, and was only saved from the scaffold by great effort on the part of his friends. In 1794 he became sub-professor of the polytechnic school, and 4 years later formed one of the scientific expedition which accompanied the French army to Egypt. In 1802 he was appointed prefect of the department of Isère, and in 1808 made a baron. By the draining of the marshes of Bourgoing, he freed more than 40 communes from the pestilential malaria to which they had always been subject. On the return of Napoleon from Elba, he issued a proclamation in favor of Louis XVIII., and was removed by the emperor, who however appointed him prefect of the Rhone. In 1817 he was appointed, jointly with Cuvier, one of the perpetual secretaries of the academy of sciences, and upon the death of Laplace in 1827 became president of the *conseil de perfectionnement* in the polytechnic school. His principal works are the *Théorie analytique de la chaleur* (Paris, 1822), and the *Analyse des équations déterminées* (Paris, 1831), a posthumous publication.

FOURNEYRON, Benoît, a French inventor, born in St. Étienne, department of the Loire, Nov. 1, 1802. He was educated at the school of mines in his native city, and upon leaving it in 1819 was employed in the mines of Creuzot, and soon distinguished himself by a variety of useful suggestions and inventions, among which the turbine is best known. His first turbine

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was exhibited with complete success at Inval, near Gisors, in 1834, and the prize of 6,000 francs, which had for 9 years remained unawarded, was bestowed upon him by the academy of sciences. His proposal to establish several of these machines in the Seine at Paris, for the purpose of supplying every part of the city with water, as well as of filling the ditches which surround the fortifications, was commended by Arago. He has published on this subject *Mémoires sur les turbines hydrauliques, et leur application en grand dans les usines et manufactures* (Liége, 1841).

FOWLER, Orson Squire, an American phrenologist, born in Cohocton, Steuben co., N. Y., Oct. 11, 1809. His parents were among the early settlers of Steuben co., and he is recorded to have been the first child born in the township of Cohocton. He was educated at Amherst college, where he was graduated in 1834, supporting himself during his collegiate course by sawing wood for his fellow students, and by teaching during vacations. Immediately after graduating he began to lecture on phrenology, a subject to which he had previously given much attention, and on which he had read Spurzheim, Combe, and the other current authors. In 1838, in conjunction with his brother Lorenzo, he established in Philadelphia the "American Phrenological Journal," and from that time forward, as editor, lecturer, and author, he has pursued a career of unusual activity. Among the many volumes on phrenology and kindred subjects which he has published, may be mentioned: "Memory and Intellectual Improvement applied to Self-Education" (1841); "Physiology, Animal and Mental, applied to Health of Body and Power of Mind" (1842); "Matrimony, or Phrenology applied to the Selection of Companions" (1842); "Self-Culture and Perfection of Character" (1843); "Hereditary Descent, its Laws and Facts applied to Human Improvement" (1843); "Love and Parentage applied to the Improvement of Offspring" (1844); "A Home for All, or the Gravel Wall and Octagon Mode of Building" (1849). In connection with his brother Lorenzo, he has written "Phrenology Proved, Illustrated, and Applied" (1836), and the "Self-Instructor in Phrenology and Physiology" (1849). He has lectured in almost every part of the United States and in Canada.—Lorenzo Niles, brother of the preceding, born in Cohocton, June 23, 1811. His early history is almost identical with that of his brother, whom he accompanied on his lecturing tours. He has also lectured alone in all the considerable towns of the United States and the British American provinces. In addition to the works written in connection with his brother, he is the author of the "Synopsis of Phrenology and Physiology" (1844), and "Marriage, its History and Philosophy, with directions for Happy Marriages" (1846). As a member of the firm of Fowler and Wells he has been engaged in publishing "Life Illustrated," a weekly journal, the "American Phrenological Journal" and the "Water Cure Journal," monthly periodicals, issued in New York.—Lydia Folger, wife of the preceding, born in Nantucket, Mass., is a graduate of the Syracuse medical college, and practises medicine. She also lectures frequently on physiology and the diseases of women and children, and is the author of "Familiar Lessons on Phrenology and Physiology" (1847), and "Familiar Lessons on Astronomy" (1848).

FOX (*vulpes*, Cuv.), a well known carnivorous animal belonging to the vulpine division of the family *canidæ*. Foxes may be distinguished from the dogs, wolves, and other diurnal *canidæ*, by their lower stature, pointed muzzle, shorter neck, slender limbs, and long, bushy, and cylindrical tail; the fur is finer, thicker, and more glossy; they diffuse a strong scent from a gland at the base of the tail, so that hounds can easily track them; they dig burrows, and hunt at night, the pupil of the eye forming a vertical fissure; the dentition is the same as that of the wolf and dog. Foxes are shy, cunning, suspicious, cleanly, unsociable, and incapable of true domesticity; their senses of sight, smell, and hearing are very acute, and their speed is great; their tricks to escape their enemies and to seize their prey are so remarkable, that the epithet foxy is proverbially applied to the cunning, deceitful, and unscrupulous knave. Stealing from his hiding place at night, the fox follows the steps of small animals, and pounces upon the hare in her form, and grouse, partridges, and pheasants on their nests; he is fond of fruit, especially grapes, and will eat squirrels, rats, moles, field mice, cheese, fish, and also small reptiles, insects, and even carrion; in cultivated districts he is fond of visiting the farm yard in search of poultry and eggs. Foxes are so cunning that they are very rarely taken in any kind of trap; the favorite and surest way of destroying them is by meat poisoned by strychnine, which is now familiarly employed for this purpose even by our remote Indian tribes. They bring forth once a year, from 4 to 8 at a birth, the young being born with the eyes closed; the breeding season in the northern states begins toward the end of February, and gestation continues 60 to 65 days. There is considerable variety in the tones of the voice; they lie down in a curved form, sleep profoundly, and, when watching birds, stretch the hind legs behind them, a habit noticed in some dogs; they hunt singly, each one plundering for the satisfaction of his own appetite. Of the 14 or more well ascertained species, 6 are found in the United States; they are distributed over the surface of both hemispheres, most abundantly in the north, and never, according to Hamilton Smith, south of the equator; the resemblance between the species is greater than in other genera of the family. Prof. Baird restricts the genus *vulpes* to those species having a long muzzle, the tail with soft fur and long hair uniformly mixed, and the temporal crests of the skull coming nearly in contact, the red fox being the type of

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this section; he proposes the genus *urocyon* for those species which, like the gray fox, have a short muzzle, the tail with a concealed mane of stiff hairs without any intermixtnre of soft fnr, the temporal crests always widely separated, and the under jaw with an angular emargination below.—The common American red fox (*V. fulvus*, Desm.) has long, silky fnr, with a full bushy tail tipped with white; the color is reddish yellow, grizzled with gray on the lower back; throat and narrow line on the belly white; back of ears and tips of the hair on the tail (except the terminal brush) black. The cross fox, the variety *decussatus* (Geoff.), has the mnzzle, lower parts, and legs black, the tail blacker, and a dark band between the shoulders crossed by another over them; this is found from northern New York to Canada and northern Michigan and Wisconsin, while the red variety occurs from Pennsylvania to Canada, and from the Atlantic to the Missouri. The silver or black fox, variety *argentatus* (Shaw), is black, except on the posterior back, where the hairs are ringed with gray, and the tip of the tail is white; this is found in Washington territory. The European red fox is a different species, the fnr being less soft and long, and the tail less bushy and more tapering; the mnzzle is longer, the eyes further apart, and the feet more slender; the red color is darker and the tint more uniform, with little of the golden hne of the American species; the space where the whiskers are inserted is white instead of dusky, and there is more white on the throat and belly; this is the *V. vulgaris* (Briss.); it is found from Spain to Norway, and from Great Britain to eastern Russia. These species and varieties vary in length from nose to root of tail from 24 to 30 inches, and the tail to end of hair from 16 to 20 inches. From the fact that in the bone caves of the United States no skulls of the red fox have been found, while those of the gray fox are common, it is believed by many naturalists that the American red fox is a descendant of the European *V. vulgaris*. The skin of the red fox is worth from $1 to $1 25, that of the cross fox abont 2 or 3 times as much, and that of the black fox much more. The American red fox, being a northern species, is rarely hunted by horses and hounds, as the nature of the country would generally render this sport impossible, and the people are too independent to permit their standing grain to be trodden down by man and beast for the sake of a poor useless fox. In Great Britain and Ireland, on the contrary, the sport of fox hunting is one of the most popular amusements of the higher classes.—The prairie fox (*V. macrourus*, Baird), the largest species known, inhabits the central portions of North America, and is noted for the beauty of its fur; its general color is like that of the red fox, and it seems to run into the variety of a cross fox; the tint is yellower, and there is more white below; the tail is uncommonly full and hairy; the skull is characterized by a muzzle as much longer than that of the red fox, as is the muzzle of the latter than that of the European species. The kit or swift fox (*V. velox*, Say) is smaller than the red species; the head is short and broad, the ears small, and the legs short; the tail is very dense and bushy; the general color above, including the ears and tail, is yellowish gray, grizzled on the back, sides pale reddish yellow, below whitish, and tail black tipped. The arctic fox (*V. lagopus*, Linn.) is chiefly confined to the arctic regions of both hemispheres, and has never been seen within the limits of the United States, though it has occasionally been found in Newfoundland; it is smaller than the red fox, with a very full and bushy tail, the soles of the feet thickly furred, and the pelage fine and dense; in the adult the color is white, in the young grayish leaden. We are familiar with the appearance and habits of this rather unsuspicious species through the narratives of Dr. Kane and other arctic explorers.—The gray fox (*V. Virginianus*, Schreb.; *urocyon*, Baird) has the head and body about 28 inches long, and the tail 14 or 15 inches; the tail has a concealed mane of stiff hairs. The color is gray varied with black; sides of neck and flanks fulvous; band encircling the mnzzle black; throat white; tail hoary on the sides, rusty below, black at the tip. The head is shorter and the body stouter than in the preceding section, and the fur is much coarser. It is decidedly a southern species, being rare north of Pennsylvania, and common from that state southward, and from the Atlantic to the Pacific; it is less daring and cunning than the red fox, and rarely visits the farm yard; it invades the nests of the wild turkey, pounces upon coveys of quails, and gives chase to the rabbit like a dog. When pursued by hounds in open woods, where it cannot skulk through thick underbrush, it will very often climb a tree. In general this species does not dig a burrow, preferring a hollow log or a hole in the rocks for its den; it is often caught in steel traps, and as a pet is less playfnl and less odorous than the red fox. Its windings when chased afford good sport for the hunter, and its chase with horses and hounds in the southern states, where the ground is favorable, is much relished as a healthful exercise and exhilarating pastime. In Carolina this species produces from 3 to 5 young at a time in March or April. The short-tailed fox (*V.* or *U. littoralis*, Baird) is about ½ the size of the gray fox, with the tail only ¼ the length of the body; it resembles a miniature gray fox, of about the size of a house cat, thongh of stouter body; it was found on the island of San Miguel, on the coast of California.—Other species of fox exist in Nepaul, in the Himalaya mountains, in Syria, and in Egypt, named respectively *V. Hodgsonii* (Hardw.), *V. Himalaicus* (Ogilby), *V. thaleb* (H. Smith), and *V. Niloticus* (Geoff.).

FOX, a N. W. co. of Iowa, newly formed, and named from the Fox Indians. It is drained by a small affluent of the Des Moines called Lizard river, and comprises an area of about

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550 sq. m. It is not included in the state census of 1856.

FOX, Sir Charles, an English civil engineer, born in Derby in 1810. After filling various subordinate positions, he was appointed by Robert Stephenson assistant engineer of the London and Birmingham railway company. After its completion he formed the business connection with Mr. Bramah which resulted in the establishment of the great engineering firm of Fox, Henderson, and co. In 1851 he presented the drawings for the crystal palace in Hyde park, on which he had labored, it is said, 18 hours a day for the previous 7 weeks. Upon the completion of this great enterprise he received the honor of knighthood. He subsequently erected the palace at Sydenham, using the materials composing that in Hyde park. In the financial crisis of 1857 the house of Fox, Henderson, and co. was compelled to suspend payment, and was afterward dissolved.

FOX, Charles James, an English statesman and orator, born in London, Jan. 24, 1749, died at Chiswick, Sept. 13, 1806. His father, the Rt. Hon. Henry Fox, afterward Lord Holland, had amassed a great fortune as paymaster of the forces, then the most lucrative post in England. His mother was a daughter of Charles, the 2d duke of Richmond, and by her he was descended from Charles II. of England and Henry IV. of France, both of whose dispositions he was thought in some measure to have inherited. It is said that his father, when he was about 14, having taken him to Spa, gave him 5 guineas a night to play with; the source, perhaps, of his invincible attachment to gaming. He studied at Westminster and Eton, where he mingled application with dissipation, and early impressed his schoolfellows with a conviction of his superiority. He spoke and wrote with readiness, and his friend the earl of Carlisle, then his fellow student, foretold that he must one day rule in senates and govern the opinions of his time. From Eton he went (1764) to Oxford. Here he gamed, studied, and spent profusely the lavish allowance given him by his father. He read Homer and Longinus, and gained a good knowledge of Greek. In later years he was able to repeat long passages from Homer with ease and accuracy. Leaving Oxford, where he was not graduated, he travelled in 1766 on the continent, and was seized with a new ambition; he songht to shine as the best dressed man in Europe; his red heels and Paris cut velvet were displayed at the courts of the continent, and he was very near becoming the most noted coxcomb of his day. He, however, was not altogether idle during his residence abroad, for he taught himself Italian, and contracted a partiality for Italian literature which lasted through his life. "There is more good poetry," he wrote to a friend at this time, "in Italian, than in all other languages I understand put together." In Aug. 1768, he returned to England and took his seat in parliament, to which he had been elected in his absence while yet under age. Here he found himself placed among the most eminent men of the day, and he resolved at once, notwithstanding his youth, to win the respect and rival the achievements of his associates. He made his first speech in the house, April 15, 1769, in favor of Luttrell against Wilkes. He spoke with insolence, according to Horace Walpole, "but with infinite superiority of parts." Through a desire to gratify his father he sustained the ministry, and was received by Lord North as a valuable accession. In Feb. 1770, he was made a junior lord of the admiralty, and in Jan. 1773, was made one of the lords of the treasury. He was possessed, however, of a strong spirit of independence, fearlessness, and self-reliance, which soon brought him into open collision with Lord North. As if hoping to intimidate his ungovernable adherent, the premier in 1774 caused Fox to be dismissed from the treasury board with every mark of contempt. But this treatment did not produce submission. Fox waited dutifully until his father's death, and then joined the opposition. The American war was now imminent. Fox assailed the leading measures of the ministry with unexampled power. Mild and gentle in his daily life and manners, yet in the house of commons, when aroused by his subject and inspired by revenge, disgust, and contempt, he assailed the feeble supporters of the crown with a vehemence that recalled the fires of Demosthenes; and as he imitated the perfect simplicity of the Greeks in his language and style, nothing intercepted the sharpness of his strokes or the clearness of his rejoinders. "He is the most brilliant and successful debater the world ever saw," said Burke of him; and this opinion was allowed to be just even by his enemies. His appearance, when aroused into eloquence, must have been singularly fine. His black hair hung carelessly over his forehead, his eyes were dark and piercing; his brown complexion reminded the spectator of his ancestor Charles II. In youth he had been fond of private theatricals, and he had then learned the art of declamation and animated gesticulation. He was always careless of his dress in later life, as if absorbed in greater objects; but his form, air, and vehemence of manner, when excited by debate, lent something terrible to his appearance. Nor was this the mere artificial rage of the actor, but rather the ardent impulses of a generous nature, excited to madness by the repeated triumphs of an infatuated ministry. Fox foretold the defeat of the British armies in America, and saw his prophecies one by one fulfilled. Edmnd Burke, now his chosen friend, stood by his side in that long struggle against Lord North which ended in the freedom of America. In 1779 he fonght a duel with a Mr. Adam, a member of parliament. While thus conspicuous as a political leader, Fox had wasted his great fortune in extravagance. He gamed to a height that astonished the frequenters of White's; his confiding natnre made him the prey of designing men and women, and he was the most noted spendthrift of

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his time. By 1780 he had squandered more than £100,000, and was often in want of small sums. He was beset by bailiffs and creditors, and Horace Walpole, on paying him a visit, found all his furniture and kitchen utensils being sold out and removed under execution. In this extremity, with his usual good humor, Fox consoled himself by writing an "Invocation to Poverty." When the ministry of Lord North fell in 1782, Fox was made secretary of foreign affairs, and at once projected a peace with the hostile powers. But his negotiations were interrupted by the death of the marquis of Rockingham, the prime minister; and when Lord Shelburne took the head of the ministry, Burke, Fox, and several of their associates thought proper to resign. In April, 1783, however, Fox again came into power, in that famous coalition which he then formed with his former enemy, Lord North. Much odium was heaped upon Burke and himself for their share in this transaction; but whatever may have been the means by which they obtained office, the object for which they employed their power was certainly a noble one. Fox now introduced his India bill, designed to relieve the sufferings of India. He pressed this measure with his usual warmth, aided by Burke; but the crown, the peers, and the India company united against him. The coalition fell, and for many years Fox was destined to remain in opposition, and out of office. When parliament was dissolved, Fox stood for Westminster, while the whole influence of the court and the ministry was arrayed against him. The old whig families and the people supported him, and he was elected by a majority of several hundred; but the court party demanded a scrutiny of the vote, and he was forced to enter parliament for a Scotch borough. The chief bailiff who had ordered the scrutiny was afterward fined £2,000 by a jury of the court of common pleas, and Fox finally triumphed. The nation was now divided into two parties, that of Fox and that of the king. "Fox," said Dr. Johnson, "is an extraordinary man; here is a man who has divided a kingdom with Cæsar, so that it was a doubt which the nation should be ruled by, the sceptre of George III. or the tongue of Mr. Fox." In the impeachment of Warren Hastings, Fox aided Burke and Windham with great zeal; he shared in their violent hostility against Hastings. When in 1788 the king became insane, Fox sought to make the prince of Wales, afterward George IV., regent; he contended that on the incapacity of the king the heir became regent of right. Pitt ridiculed his doctrine of indefeasible right, and when Fox first propounded it said with exultation: "Now I'll unwhig the gentleman." The king recovered, and the nation escaped the rule of the unpopular son. Fox next directed his attention to France, just rising in revolution. He had always been friendly to popular progress; he now believed that a new era was opening upon Europe. His letters to his nephew Lord Holland, edited by Lord John Russell, commence with May 26, 1791, and bring into clear light his liberal principles. From the first he rejoiced in the effort of the French to govern themselves, excused their faults, lamented their failures, and still looked forward with hope, even when the massacres of the Temple and the execution of the king had shocked his humanity and touched his heart. When the allied armies cross the French frontiers to crush the germs of freedom, he trembles; and when they fly before the energy of the republicans, he exults over the misfortunes of the royalists. He wishes that the French were more like "our old friends the Americans;" he defends the Jacobins while he denounces their needless cruelty; he declares the policy of Pitt to be "detestable." Fox and Burke were now to separate for ever. Fox not only called Burke's splendid attacks upon the French revolution "mere madness," but praises a pamphlet which had been written against his old friend by "one Mackintosh." This was the *Vindiciæ Gallicæ* with which Sir James first made his way to renown. But when Burke proclaimed in parliament their final separation, Fox burst into tears. About this time, 1791, he actively aided Wilberforce in his efforts to abolish the slave trade, and on that subject delivered one of his finest speeches. In 1793 he supported Mr. (afterward Lord) Grey's motion for parliamentary reform. He soon became the leader of a party pledged to political reform. Pitt, sustained by great majorities, defeated every liberal measure, and Fox and his adherents were looked upon as dangerous factionists. He was member of several leagues formed to amend the British constitution, but finding his opposition in the house of commons useless, in 1797 ceased to attend its meetings. The latter portion of his life from 1797 was chiefly passed at St. Ann's Hill in literary retirement. He hoped to produce some work which might procure him a lasting fame. He projected an edition of Dryden, a defence of Racine and the French stage, and a disquisition to refute the false theories of Hume's history. Finally he resolved to compose a history of the revolution of 1688, the period of their national history which he thought least understood by his countrymen. His researches were wide and laborious. In 1802 he went to Paris to make collections for his historical design, and there saw Napoleon, who treated him with marked distinction. Fond of every form of genius, he was charmed and impressed by that remarkable man; there grew up a kind of friendship between them, founded upon mutual respect, which Fox transmitted to his nephew, and the good feeling of Holland house was afterward felt by Napoleon in St. Helena. The history was never completed; it extends only to the death of Monmouth. He was accustomed to dictate his narrative to Mrs. Armistead, a lady with whom he lived, or to some other amanuensis, as he would have done a debate. He married Mrs. Armistead in 1802. Pitt

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having died in 1806, after the battle of Austerlitz, pacific measures were resolved upon, and Fox became secretary of foreign affairs in the new ministry. He now had an occasion of obliging Napoleon. A person proposed to him to assassinate the French emperor. Fox at once directed him to be imprisoned, and wrote a letter to Talleyrand informing him of the danger to Napoleon, and offering him the opportunity of prosecuting the assassin in the English courts. Napoleon directed Talleyrand to thank the English minister for this friendly act, to which Fox replied in a cordial note frankly offering peace. But death, which had already borne away Pitt from the midst of his disappointments, now struck down his ancient rival in the moment of his triumph. Fox died of dropsy at Chiswick house, after having been tapped 3 times in 5 weeks. He had always been a favorite with all orders of his countrymen, and his funeral was attended by a great multitude of the noble, the middle classes, and the poor. He was buried in Westminster abbey. Although Fox lived wholly without restraint and gratified every desire, yet happily he had many noble and generous impulses which preserved him from the worst features of sensuality and vice. Such was the sweetness of his temper, the generosity of his disposition, and the magnanimity of all his conduct, that he was loved and honored by the purest men of the time. Burke loved him as his chosen friend; with Wilberforce he labored side by side in the cause of humanity; and even the austere Johnson boasted of his friendship. In his political principles he was firm and unbending; no emotion of ambition took him from the path of honor; no opposition terrified or discouraged him. He gave to the whig party of England its distinguishing principles; he originated those measures of reform in the constitution which have finally been adopted; and probably no other statesman has had so large an influence upon the politics of England. Sir James Mackintosh says of him: "He certainly possessed, above all moderns, that union of reason, simplicity, and vehemence which formed the prince of orators. He was the most Demosthenean speaker since Demosthenes."—See "Characters of the late Charles James Fox," by Dr. Samuel Parr (2 vols. 8vo., London, 1809); "Speeches in the House of Commons," by C. J. Fox, with a biographical and critical introduction by Lord Erskine (6 vols. 8vo., London, 1815); "Memoir of C. J. Fox," by John Allen (London, 1820); "Memorials and Correspondence of Charles James Fox," by Lord John Russell (3 vols. 8vo., London, 1854). Some interesting particulars of the private life of Fox are given in the posthumous "Recollections of Samuel Rogers" (London, 1859).

FOX, George, founder of the society of Friends, born in Drayton, Leicestershire, England, in July, 1624, died in London, Jan. 13, 1691. His father, a zealous advocate of Presbyterian doctrines, early imbued his son's mind with sentiments of truth and piety, but was unable to afford him any education beyond reading and writing. As a boy he showed a gravity and a love of solitude and contemplation unusual to childhood, and which the occupation of tending sheep, to which his earlier years were devoted, served to confirm. He was in due time apprenticed to a shoemaker; but keeping aloof from his fellow workmen, he meditated upon the Scriptures, gradually shaping the doctrines which he afterward promulgated. About the age of 18, under the influence of the religious enthusiasm which this course of life engendered, he abandoned his occupation in order to prepare himself for the mission to which he believed he had been called. For some years he led a wandering life, living in the woods and in solitary places, and practising a rigid self-denial. His friends at one time induced him to return to his home, but in a short time he resumed his solitary and nomadic life, and finally, in 1648, made his appearance as a preacher at Manchester, where the exposition of his peculiar views caused a prodigious excitement, and subjected him to imprisonment as a disturber of the peace. Thenceforth, undeterred by the assaults of the populace or the persecutions of the magistrates, he travelled over England, preaching his doctrines with an earnestness and perseverance which no harsh treatment could abate, and with a persuasiveness also which won him many converts. He advocated virtue, charity, the love of God, and a reliance upon the inward motions of the Spirit, by which, as he asserted, and not the Scriptures, "opinions and religions are to be tried." Simplicity, not merely in religious worship, but in all the relations of life, was also urged upon his converts; and to his refusal to recognize the ordinary tokens of outward respect, which, to use his own words, "made the sects and professions to rage," as well as to take any oath, are to be ascribed most of the persecutions and imprisonments to which he was subjected. The term Quakers was first applied to Fox's followers at Derby, in 1650, in consequence of his telling Justice Bennet, before whom he had been brought, to "tremble at the word of the Lord," or from the tremulous tones in which they were accustomed to speak. In 1655 Fox was carried a prisoner to London and examined in the presence of Cromwell, who not only released him, declaring that his doctrines and conduct were equally harmless, but on several subsequent occasions protected him from persecution. In 1669 he was married to the widow of a Welsh judge, and 2 years afterward, having preached in England, Ireland, and Scotland, and made thousands of converts, including men of position and learning, like Penn and Barclay, he visited the North American colonies, in nearly all of which he preached. On his return to England, in 1673, he was imprisoned for refusing to take the oath of supremacy, and for exciting disturbances among the king's subjects; but having been released within a year, he went

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to Holland, where his preaching seems to have been attended with considerable success. He returned to England, was again imprisoned for refusing to pay tithes, revisited Holland in 1684, extending his travels to Hamburg, Holstein, and even to Dantzic, and a few years before his death established himself in London, where he rested from his arduous labors, although he continued to preach occasionally. Fox was a man of genuine piety, and his meekness, humility, and moderation are mentioned in terms of high praise by his friend William Penn, who says that "he had an extraordinary gift of opening the Scriptures, but above all excelled in prayer." Although he was a man of limited education, his published works, containing his journal, correspondence, and all his writings upon his doctrine, are numerous and curious. They were partially collected in 3 vols. fol., 1694–1706. An edition in 8 vols. 8vo. has been published in Philadelphia.—See the "Life of George Fox, with Dissertations on his Views," &c., by S. Janney (1 vol. 8vo., Philadelphia, 1852).

FOX, John, the English martyrologist, born in Boston, Lincolnshire, in 1517, died in London in 1587. He was educated at Oxford, and elected a fellow of Magdalen college in 1543, but becoming a convert to Protestantism was deprived of his fellowship in 1545, and reduced to great distress by the withholding of his patrimony on the same pretext. After some time he obtained a situation as tutor in the family of Sir Thomas Lucy, immortalized by the story of Shakespeare's robbing his deer park. He was next employed in the house of the duchess of Richmond as tutor to the children of her brother the earl of Surrey, then imprisoned in the tower, and afterward executed. Here he remained many years, and on the accession of Edward VI. was restored to his fellowship. In the reign of Mary he was obliged to flee to the continent, where he was employed by Oporinus of Basel as a corrector of the press. On the death of Mary he returned to England, and was appointed by Cecil to a prebend in the cathedral of Salisbury. This office he retained while he lived, his refusal to subscribe to the new articles of religion preventing any further preferment. He was the author of numerous works, and even of some Latin poetry and sacred dramas. All are, however, now nearly forgotten, save his "History of the Acts and Monuments of the Church," commonly called "Fox's Book of Martyrs," which first appeared in London in 1553, and which, in despite of its many defects and inaccuracies, still maintains its place as a popular work. It details the sufferings of the early Protestant reformers from "the great persecutions, and horrible troubles, that haue been wrought and practised by the Romishe prelates, especiallye in this realme of England and Scotlande, from the yeare of our Lorde a thousande, vnto the tyme now present," and met with great success, though its trustworthiness has always been disputed by Catholics.

FOX, William Johnson, an English Unitarian clergyman and politician, born in Wrentham, Suffolk, in 1786. He was educated at Homerton Independent college, and embracing Unitarian doctrines, became a preacher, in which capacity he officiated many years at the chapel in Finsbury square, London. He has always taken an active part in politics, and is an able and frequent speaker and writer on the extreme liberal side. For most of the time during the last 12 years he has represented the borough of Oldham in parliament. He wrote the first article in the first number of the "Westminster Review," and has since been among its regular contributors. He has also been one of the chief writers for the "Weekly Despatch" newspaper, and has been similarly connected with other prominent magazines and newspapers. Among his published works are a volume of "Lectures on Religious Ideas," "Lectures to the Working Classes" (4 vols. 12mo.), &c.

FOXGLOVE. See Digitalis.

FOX INDIANS, or Ottigamies, a tribe of the Algonquin nations, belonging to the western group with the Sacs, Miamis, Menomonees, and others; they formerly lived at the S. end of Green bay, Wisconsin, but are now removed beyond the Mississippi. They have long been united with the Sacs, and indeed form with them one tribe in language, features, customs, and social and political interests. They are a fine, athletic, brave, and warlike people, more averse to the restraints of civilization than most of the tribes within our borders; the internal capacity of the cranium, according to Dr. Morton's measurements, is very large, and in the few specimens examined by him equal to the Caucasian standard. The number of the tribe has been variously estimated at from 1,600 to 2,400; before the revolution their warriors were estimated at from 100 to 250; in 1806 there were 400 warriors and 1,750 souls, trading in deer and bear skins and a few furs, living opposite Prairie du Chien, at the confluence of the Mississippi and Wisconsin rivers, and at that time at war with the Chippewas; in 1825 they lived in Illinois and the Missouri territory, numbering with the Sacs 6,400 souls, and claiming between 4,000,000 and 5,000,000 acres of land on both sides of the Mississippi; in 1829 the Foxes were estimated at 1,600, and the Sacs at 5,000, united into one tribe by a treaty made at St. Louis in 1804; in 1846 their agency was at Osage river, and the whole number was about 2,500, owning 3,000 horses, supporting themselves by agriculture and hunting, and enjoying an annuity of $81,000; from the delegation which visited Washington in 1852, it appears that the Foxes then numbered only 700, with a fund of $30,000; disliking schools, missionaries, and even dwellings of civilized man, and adhering to their old religion. By the treaty of 1804, the Sacs and Foxes (for they cannot be separated) ceded to the United States all their land east of the Mississippi, nearly 10,000,000 acres, for an equivalent of money and goods worth about $22,000; in 1824 they with the Iowas ceded 10 000,000

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acres more for $60,000; and in 1831 with the Sioux over 16,000,000 acres for about $318,000; in 1833 they ceded 5,760,000 acres for about $737,000; in 1837, 256,000 acres for nearly $200,000; and in 1838, 1,250,000 acres for $377,000. In 1829 they owned the country on the Mississippi from the northern boundary of Missouri to the upper Iowa river, and their claim extended to the Calumet branch of the Missouri; the Iowas were jointly interested in this tract; at this time about 200 Sacs and Foxes lived on the Little Platte river. By treaty of Oct. 1837, the Missouri Sacs and Foxes had $175,400 at interest at 5 per cent; and by the treaties of Oct. 1837, and 1842, the Mississippi tribes of this name had $1,000,000 invested for their benefit.—The name of Fox Indians is sometimes given to the inhabitants of the Fox islands, between the N. W. coast of America and Kamtchatka; they belong to the Asiatic fishing tribes, living on seals, stranded whales, and other marine products; they are a quiet, timid race, short in stature, with projecting cheek bones, flat faces, and small eyes; they resemble in appearance, habits, and language the Esquimaux of America, and are probably derived from the same stock.

FOX ISLANDS. See Aleutian Islands.

FOX RIVER, a river of Wisconsin, called by the Indians *Neenah*. It rises in Marquette co., near the centre of the state, and after a course of about 200 m., during which it makes numerous bends and passes through Lake Winnebago, it enters the head of Green bay. The lower part of its course furnishes valuable and extensive water power, but it is chiefly important as the basis of a series of improvements undertaken some years since with a view of opening water communication between Lake Michigan and the Mississippi. A canal has been cut from Fox river to the Wisconsin, which is a navigable affluent of the Mississippi, and the channel of the river below Lake Winnebago has been cleared to admit steamboats from Lake Michigan and Green bay. A grant of land was made by congress to assist the work.

FOY, Maximilien Sébastien, a French general and orator, born in Ham, Feb. 3, 1775, died in Paris, Nov. 28, 1825. He entered the army in 1791 as a 2d lieutenant of artillery, served under Dumouriez, and fought for the first time at the battle of Jemmapes. He was imprisoned at Cambrai in 1793 by Joseph Lebon, but was saved from death by the events of the 9th Thermidor. He served with distinction in the army of the Rhine and Moselle until 1797. Declining to serve as an aide-de-camp to Bonaparte on his expedition to Egypt, he was employed in the so called "army of England," and served under Masséna in Switzerland, where he signalized himself at Zurich and Schaffhausen. In 1800 he was attached for a while to the army under Moreau, before joining that of the first consul in Italy, where he was wounded for the 2d time. In 1801 he became a colonel; but his freedom of speech and his vote against making Napoleon emperor impeded his further advancement. He was active during the campaign in Austria in 1805, and at Constantinople where he had been sent in 1807 to aid the sultan Selim against the English. Being ordered to Portugal in 1808, he took a distinguished part in the battle of Vimieiro, and the emperor made him a brigadier-general, and two years later a general of division. At Salamanca he protected the retreat of the French army, and during the following campaigns gained great applause by his skilful manœuvres. At the battle of Orthez in 1814, he was so seriously wounded that his life was despaired of. On the first restoration he was appointed inspector-general of infantry; during the Hundred Days he was placed in command of a division, fought heroically at the battle of Quatrebras, and was wounded at Waterloo. On the second restoration he returned to private life, and devoted himself to a history of the peninsular war. In 1819 he was elected to the chamber of deputies by the department of Aisne, and delivered his maiden speech in December. This speech, in which he supported the just claims of an old soldier, made a sensation, not only among the representatives, but among the people. For 6 years he held his seat in the legislature where he was, indeed, the national orator. His health, impaired by his former wounds, broke down under his parliamentary labors, and after a few weeks of suffering he died of a disease of the heart. No fewer than 100,000 citizens attended his funeral; and it having been reported that the only inheritance left his children was his fame, subscription lists were opened, and within a few days the amount had reached 1,000,000 francs. The speeches of Gen. Foy were collected and published in 2 vols. 8vo. (Paris, 1826). His unfinished *Histoire de la guerre de la péninsule* appeared in 1827, in 4 vols. 8vo.

FRACTION (Lat. *frango*, to break), in arithmetic and algebra, an expression for an unexecuted division, originally invented to represent a quantity less than a unit. Thus ½ originally signified three quarters of one, and afterward was used for the fourth part of three, these two quantities being identical. The dividend number is called the numerator, because in arithmetic it numbers how many parts are taken; and the divisor is called the denominator, because it names the parts. These terms are retained in algebra, where it is evident that their literal meaning is inapplicable. Fractions are also used to express the ratio of the numerator to the denominator. Thus the expression $\frac{a+b}{a-b}$ may signify the ratio of the sum of the quantities a and b to their difference, or the quotient arising from the division of that sum by that difference. The propriety of indicating the quotient and the ratio by the same sign is evident from the consideration that the quotient bears the same ratio to unity that the dividend bears to the divisor. A decimal fraction is one whose denominator consists of 1 with zeros annexed, in which case

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the denominator is not written, but is understood from a point being prefixed, with zeros if necessary; thus, .0371 for $\frac{371}{10000}$. A continued fraction is a fraction whose numerator is 1, and whose denominator is a whole number plus a fraction whose numerator is 1 and denominator a whole number plus a fraction, &c.

FRACTURE, in surgery, a solution of continuity of one or several bones, produced by external violence or the sudden and forcible contraction of muscles. When there is no external wound, the fracture is said to be simple; when complicated with lesion of the surrounding soft parts, compound; and comminuted, when the bone is broken into many fragments. Fractures may occur at any time from the end of intrau-terine life to extreme old age; in youth, fractures are comparatively rare on account of the elasticity of the bones, and in advanced life common from their brittleness. Ruptures of vessels and nerves are the most dangerous complications of fractures of the extremities; gangrene is often the consequence of the former, and paralysis, convulsions, or intense pain and inflammation, of the latter; comminuted fracture is very apt to be followed by tedious suppuration, necrosis, false joint, or much shortened limb; dislocation also is not unfreqnently added to fracture. Fractures may be transverse or oblique; the former are most common in children, and are accompanied by little displacement; the latter are the most frequent, and often require all the surgeon's skill and sufferer's patience to effect permanent reduction and prevent deformity of the limb. The causes of displacement in the ends are muscular contractions and the weight of the fractured part; the lower fragment rides over the upper, sometimes to the extent of several inches. The bones most liable to fracture are the superficial ones, like the clavicle, tibia, and skull; or such as, like the radius in the forearm, are likely to receive the weight of the body during a fall; old age, caries, and cancerous, scorbutic, and venereal diseases, predispose to fracture. Violence applied to a part does not always produce a direct fracture; for instance, a fall upon the shoulder may indirectly break the clavicle; the knee-pan and the olecranon are the bones most commonly broken by muscular action. The physiological symptoms of fracture are pain and inability to move the limb; the physical characters are unnatural mobility, change in the length, direction, or form of the limb, and crepitation when the broken fragments are moved upon each other. When there is great swelling, it is often difficult to ascertain the nature or even the existence of a fracture. The course of a simple fracture is a painful and inflamed swelling a few days after the accident, with more or less febrile reaction; these gradually subside, and with proper treatment the bone unites in from one to two months, with or without deformity according to circumstances not always under the control of the surgeon; when the constitution is diseased, or the reparative process injudiciously interfered with, union may not take place and a false joint be formed. Complicated fractures often terminate in death of portions of bone and of the soft parts, in unhealthy abscesses and tetanus, leading perhaps to fatal consequences unless the limb be removed. The prognosis of fracture of course depends on its situation, extent, complication with wounds, and a variety of circumstances which will occur to every physician. The process of reparation has been described in the article Bone (vol. iii. p. 480), and it will only be necessary to say here that lymph is effused between the broken surfaces, which is gradually converted into cartilage, and in a few weeks into a spongy ossific mass called the provisional callus; this holds the ends together for a few months until the permanent callus is deposited between them; the former is gradually absorbed, and the latter has all the characters of true bone. In the interior of the skull, however, and in the cavities of the synovial membranes of the joints, no provisional callus is formed; if the parts be kept in close apposition, bony union will slowly take place; if not, the union will be ligamentary. The indications of treatment are to reduce or set the fragments, and keep them at rest and in close contact, so as to prevent deformity; all disturbing muscles must be relaxed, the ends of the bones extended, and the parts properly supported and kept in place; the limb is bandaged, to prevent swelling and muscular contractions; and some kind of splint or apparatus is applied to keep the limb immovable and of its natural length. Splints are made of wood, pasteboard, tin, and more recently and best of sheet gutta percha, all properly padded and secured against displacement; the starched bandage, consisting of layers of cloth imbued with starch or dextrine, is light, firm, and capable of very exact application; a plaster of Paris apparatus has been much used in Germany, especially for intractable persons and on the field of battle. When swelling and inflammation run high, antiphlogistic and refrigerant applications should precede the use of bandages and splints; and the latter when applied should be loosened when swelling comes on, and afterward readjusted so as to keep the parts uniformly in place. The variety of bandages, splints, and apparatus for the different kinds of fractures is very great; and in nothing does American surgery stand more preeminent than in its ingenious and effectual instruments for the treatment of broken bones. The accompanying symptoms of depression, inflammation, delirium, painful twitchings of muscles, and other complications, must be treated on principles familiar to every surgeon. When a false joint is produced, attempts at union are made by exciting inflammation in the separated pieces by rubbing, the seton, sawing off the ends, and other operations now in vogue; care being taken at the same time to strengthen the patient, and to correct any evident constitutional vice. In compound frac-

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tures, especially the severe ones now so common from railroad accidents, the question of amputation is frequently a most difficult one to resolve; much depends on the strength, habits, and age of the patient, the degree of laceration, the proximity to joints, and the injury to vessels and nerves; if the operation be decided on, it is generally performed at once, before the accession of inflammatory fever. If it be determined to retain the limb, the bone should be reduced, loose pieces removed, and the necessary applications be made to induce the wounds to heal; in proper time bandages and splints should be applied; cooling lotions, opium to quiet pain and restlessness, prevention of lodgment of matter, tonics and stimulants to support the strength under profuse discharges, are the additional general indications of treatment. Particular fractures require special apparatus, of which neither the limits nor the character of this work will permit any description.

FRAMINGHAM, a township of Middlesex co., Mass., on the Boston and Worcester railroad, at its junction with a branch road to Milford; pop. in 1855, 4,676. It borders on Cochituate lake, and contains several ponds abounding in fish and wild fowl. In 1855 it contained 3 woollen mills, with $300,000 capital, employing 274 hands, and manufacturing yearly $764,650 worth of goods, 5 car and carriage factories, and 2 hat and bonnet factories. In 1858 it had a bank, a savings bank, a high school, and 7 churches, 2 Baptist, 2 Congregational, 1 Methodist, 1 Roman Catholic, and 1 Unitarian.

FRANC, the monetary unit in France since 1795, in Belgium since 1833, and in Switzerland since 1849. The first coins having this name were manufactured under John the Good in 1360; they were of fine gold, and were called *francs à cheval* from the impression upon them. These coins in 1695 were intrinsically worth 7 livres. Under Charles V. the impression was changed, and they were styled *francs à pied*, but retained the same value. The first silver coin called a franc was struck by order of Henry III. in 1575, and presented on one side the head of the king and on the other a decorated cross. The franc became the monetary unit on the establishment of the decimal system, and is equal in value to about 19¼ cents. The franc and livre were originally synonymous as moneys of account, but the old livre tournois is now reckoned at 1¼ per cent. less, or as 81 to 80. The Swiss franc was formerly one-half greater than now. Of silver coins, there are ¼, ½, 1, 2, and 5 franc pieces; and of gold coins, formerly only pieces of 20 and 40 francs, but since 1830 also of 10 and 100 francs, and in Belgium of 2½ francs.

FRANCE (Lat. *Gallia* or *Francia*), one of the principal states of Europe, occupying the western end of the central part of that continent, between lat. 42° 20′ and 51° 5′ N. and long. 4° 50′ W. and 8° 20′ E. It is bounded N. by the North sea and the strait of Dover (*Pas-de-Calais*), and N.W. by the English channel (*La Manche*), which separate it from Great Britain; W. by the Atlantic and the bay of Biscay; S. by the Pyrénées, forming its frontier toward Spain, and by the Mediterranean; E. by the Var, the Alps, and the Rhone, the Jura mountains and the Rhine, which respectively divide it from the Sardinian states, Switzerland, and the grand duchy of Baden; N. E., on which side it has no natural boundary, by a conventional line which runs from the left bank of the Rhine at its junction with the Lauter, to the shores of the North sea, some 20 m. E. of the straits of Dover, along the frontiers of Rhenish Bavaria, Rhenish Prussia, the grand duchy of Luxemburg, and Belgium. Under the meridian of Paris, that is, toward its centre, it measures N. to S. abont 598 m., and E. to W., between lat. 48° and 49°, about 572 m.; while its greatest length N. W. to S. E., from the extremity of Finistère to the month of the Var, is 664 m., and its greatest breadth, N. E. to S. W., from the month of the Lauter in the Rhine to that of the Bidassoa in the bay of Biscay, a line crossing the former nearly at right angles, is about 620 m. Its entire line of frontier is estimated at about 2,930 m., of which 1,530 are coast and 1,400 on the land side. Its total area, Corsica included, is officially computed at 52,768,618 hectares, or 203,736 sq. m. It holds the 5th rank in point of extent among European countries, being surpassed by Russia, Sweden, the Austrian empire, and Germany. Previous to the revolution of 1789 France was divided into 36 provinces, which differed from each other in extent, population, rights, immunities, and administration. Now it contains 86 departments, the extent of which is nearly equal. They are subdivided into 363 arrondissements, 2,850 cantons, and 36,826 communes or villages. Sixty-five of the departments are named from the rivers by which they are drained, 11 from mountains, 3 from their situation, 3 from the country in which they are situated, 2 from the sea or straits which border on them, 1 from a forest, and 1 from a spring. The following table shows the departments, the provinces from which they have been chiefly formed, their population in 1856, and their capitals:

Provinces.	Departments.	Pop. in 1856.	Capitals.
N. Division:			
Flanders	Nord	1,212,859	Lille.
Artois	Pas-de-Calais	712,846	Arras.
Picardy	Somme	566,619	Amiens.
Normandy	Seine-Inférieure	769,450	Rouen.
	Eure	404,665	Evreux.
	Orne	436,127	Alençon.
	Calvados	478,397	Caen.
	Manche	595,209	Saint Lô.
Central Division:			
Isle of France	Seine	1,727,419	Paris.
	Seine-et-Oise	494,179	Versailles.
	Oise	396,085	Beauvais.
	Seine-et-Marne	341,882	Melun.
Champagne	Aisne	555,339	Laon.
	Ardennes	322,188	Mézières.
	Marne	372,050	Châlons-sur Marne.
	Aube	261,673	Troyes.
	Haute-Marne	256,512	Chaumont.

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(*Table continued.*)

Provinces.	Departments.	Pop. in 1856.	Capitals.
Lorraine	Meuse	305,727	Bar-le-Duc.
	Moselle	451,152	Metz.
	Meurthe	424,378	Nancy.
	Vosges	405,708	Epinal.
Orléanais	Loiret	345,115	Orleans.
	Eure-et-Loir	291,074	Chartres.
	Loir-et-Cher	264,043	Blois.
Touraine	Indre-et-Loire	318,442	Tours.
Berry	Indre	278,479	Châteauroux
	Cher	314,844	Bourges.
Nivernais	Nièvre	326,086	Nevers.
Bourbonnais	Allier	352,241	Moulins.
Marche	Creuse	278,889	Guéret.
Auvergne	Puy-de-Dôme	590,062	Clermont-Ferraud.
	Cantal	247,665	Aurillac.
Limousin	Haute-Vienne	319,787	Limoges.
	Corrèze	314,992	Tulle.
E. Division:			
Alsace	Bas-Rhin	563,855	Strasbourg.
	Haut-Rhin	499,442	Colmar.
	Haute-Saône	312,397	Vesoul.
Franche Comté	Doubs	296,888	Besançon.
	Jura	296,701	Lons le Saulnier.
	Yonne	368,901	Auxerre.
Burgundy	Côte d'Or	383,131	Dijon.
	Saône-et-Loire	575,018	Mâcon.
	Ain	370,919	Bourg.
Lyonnais	Rhône	625,991	Lyons.
	Loire	505,260	Montbrison.
W. Division:			
Brittany	Finistère	606,552	Quimper.
	Côtes-du-Nord	621,578	Saint-Brieuc.
	Morbihan	473 932	Vannes.
	Ille-et-Vilaine	580,598	Rennes.
	Loire-Inférieure	555,996	Nantes.
Maine	Mayenne	373,541	Laval.
	Sarthe	467,193	Le Mans.
Anjou	Maine-et-Loire	524,387	Angers.
	Vienne	322,585	Poitiers.
Poitou	Deux-Sèvres	327,546	Niort.
	Vendée	389,683	Napoléon-Vendée.
Aunis and Saintonge	Charente-Inférieure	474,828	La Rochelle.
Angoumois	Charente	378,721	Angoulême.
Guienne	Gironde	640,757	Bordeaux.
	Dordogne	504,651	Perigueux.
	Lot-et-Garonne	340,041	Agen.
	Lot	293,738	Cahors.
	Tarn-et-Garonne	234,782	Montauban.
	Aveyron	393,890	Rodez.
S. Division:			
Gascony	Landes	309,832	Mont de Marsan.
	Gers	304,497	Auch.
	Hautes-Pyrénées	245,856	Tarbes.
Béarn	Basses-Pyrénées	436,442	Pau.
Foix	Ariège	251,318	Foix.
Roussillon	Pyrénées Orientales	183,056	Perpignan.
Languedoc	Haute-Garonne	451,247	Toulouse.
	Tarn	354,532	Alby.
	Aude	282,833	Carcassonne.
	Herault	400,424	Montpellier.
	Gard	419,697	Nimes.
	Lozère	140,819	Mende.
	Haute-Loire	300,994	Le Puy.
	Ardèche	385,385	Privas.
Dauphiné	Isère	576,637	Grenoble.
	Drome	324,760	Valence.
	Hautes-Alpes	129,556	Gap.
Avignon	Vaucluse	268,994	Avignon.
Provence	Basses-Alpes	149,570	Digne.
	Bouches-du-Rhône	473,965	Marseilles.
	Var	371,920	Draguignan.
Corsica	Corse	240,183	Ajaccio.
Total		36,039,364	

—In population, France ranks 4th among the great European states, being inferior only to Russia, Germany, and Austria. It has increased but slowly during the last century, in comparison with the progress of Great Britain and the United States. We gather the following figures from authentic documents:

Years.	Population.	Years.	Population.
1700	19,669,320	1831	32,560,954
1762	21,769,163	1836	32,540,910
1780	24,800,000	1841	34,230,178
1790	26,500,000	1846	35,401,761
1801	27,349,003	1851	35,781,628
1806	29,107,425	1856	36,039,364
1820	30,461,187		

According to this table, within a period of a century and a half the population has not even doubled, while within the last 50 years its increase has not been quite 40 per cent.; but it must be borne in mind that during the first part of this period the population was heavily taxed by the bloody wars of the empire, by which France lost no fewer than 1,700,000 men on the battle field. During this period of 50 years the population of Great Britain has nearly doubled, and that of the United States increased nearly fivefold. A comparison between the census of 1790 and that of 1856 shows that the increase has been very unequally divided among the departments. Nine of them, Seine, Nord, Rhône-et-Loire (now divided into 2, the Rhône and the Loire), Seine-Inférieure, Isère, Manche, Maine-et-Loire, Haute-Garonne, and Bas-Rhin, have nearly doubled their population; in 1790 it was in the aggregate 3,960,996, while it amounts now to 7,581,801. It may be added that the first two on the list have more than doubled; that of the Seine, for instance, from 723,333 in 1790 reached 1,727,419 in 1856, the increase being 1,002,086. Of this, 300,000 have been gained within the last 5 years, and the ratio of increase is still augmenting. Paris, more than any other great city, seems to be an absorbing centre. On the other hand, 9 departments show a decrease for the same semi-centennial period; these are Yonne, Basses-Alpes, Lozère, Hautes-Alpes, Côte-d'Or, Indre-et-Loire, Cantal, Morbihan, Seine-et-Marne, whose aggregate population in 1790 was 2,925,894, while in 1856 it was but 2,555,498, a decrease of 370,396. Although trifling, this is not easily accounted for, if we except Seine-et-Marne. This is one of the most prosperous departments in the empire, owing to its vicinity to the capital, but this vicinity and the increasing number of elegant country seats have contributed to lessen the population. The case is nearly the same with Eure, Orne, and Oise, whose population has remained nearly stationary. The total increase for the last 50 years amounts to 7,000,000. The N. W. region, where Paris is situated, has gained the most; then comes the S. E., in which are Lyons and Marseilles. If we divide the departments into 4 classes according to their ratio of increase, we find that the first class (21 departments) has increased 80 per cent., the 2d class 35 per cent., the 3d 25 per cent., while the 4th has been stationary or decreasing. If we draw an imagi-

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nary line E. and W. through France about the parallel of 47°, we shall find that the 40 departments N. of that line, with an area of 92,230 sq. m., have a population of 19,500,000; while the 46 departments chiefly S. of the same line, with an area of 111,505 sq. m., have a little over 16,500,000. The N. of France therefore, with a surface 19,275 sq. m. less than the S., has 3,000,000 more inhabitants. The average population to the square mile is estimated at 180, which is precisely the density of the department of Jura. There are 37 departments more thickly peopled than the average, but in general only slightly so. The most densely inhabited, the small department of the Seine, in which Paris is situated, has 8,346 inhabitants to the square mile, the department of Nord 653, that of the Rhône 472, and that of Seine-Inférieure 397. That of the Basses-Alpes, the least populous, has only 60. As to occupation, the total population of France is divided as follows:

Agriculturists	20,551,628
Manufacturers	2,844,871
Mechanics	7,818,144
Liberal professions	3,991,196
Servants	738,565
Miscellaneous	780,599
Total	36,039,364

According to statistical tables published by the government, deducting children, invalids, &c., the active population of France is estimated at 23,500,000, of whom 14,300,000, or a little over 60 per cent., follow agricultural pursuits. The rural population, which amounts in all to 22,000,000, has increased only 1,500,000 within the last 60 years, while the city population has grown from 6,000,000 to 14,000,000. This may be partly ascribed to the increase of commerce and industry; but it is also owing to the allurements offered by cities to the most active or ambitious among the rural population. The following table shows the numbers of births and deaths during each of the 6 years ending with 1855:

BIRTHS.

Years.	Legitima'e.		Illegitimate.		Total.
	Males.	Females.	Males.	Females.	
1850	459,806	438,712	35,902	34,652	969,073
1851	466,835	442,022	35,755	35,195	979,907
1852	459,589	435,697	35,415	34 429	965,080
1853	447,065	421,600	35,281	33,051	936,967
1854	438,182	415,182	35,652	34,445	923,4 1
1855	429,454	405,594	32,792	31,419	899,559

DEATHS.

Years.	Males.	Females.	Total.
1850	389,506	386,147	775,653
1851	410,748	406,706	817,449
1852	406,197	404,388	810,695
1853	397,150	398,446	795,596
1854	498,965	494,514	992,779
1855	480,968	450,870	936,838

It will be seen that in 1854 the deaths exceeded the births by 69,318, and were to the whole estimated population as 1 to 36. In 1855 there was only an excess of 37,274. The average ratio of mortality from 1817 to 1854 (38 years) was 1 to 41 of the whole population. The births were to the deaths as 118 to 100, and to the population as 1 to 34. For the last 10 or 12 years the annual average of marriages was 279,500, except in years when bread was dear, as in 1847 and 1854, when there were only 270,633 and 270,906 marriages. In 1855, notwithstanding the high price of provisions and the increase in the army, the number of marriages was 283,486, or 1 marriage to 127 inhabitants. The large and populous cities of France are comparatively few. Paris, the capital, has (1856) 1,178,262 inhabitants; Lyons, which comes next, has but 255,960; Marseilles, 215,196; Bordeaux, 140,601; Nantes, 101,019; Rouen, 94,645; Toulouse, 92,223; St. Étienne, 91,933; Lille, 71,286; Strasbourg, 65,120; Havre, 62,468; and Amiens, 52,149.—The bulk of the French nation consists of the descendants of Gallo-Romans mixed with German and Scandinavian barbarians (Burgundians, Goths, Franks, and Northmen), who invaded Gaul between the 5th and 10th centuries. But the latter elements are far from being important, and the French may be called a neo-Latin race; their language partakes of the same character, being Latin with a slight admixture of Germanic and Celtic. Although the various races have melted into a single people, some of the original types may be still traced, especially in the remote parts of the country or along the frontiers. The inhabitants of Brittany, 2,800,000 in number, mostly retain the characteristic features of their ancestors, and the Breton language is still spoken in the western part of that province. The Basques preserve their primitive language. Alsace and Lorraine are inhabited by about 1,300,000 Germans, who speak both German and French; while the Corsicans speak Italian. There are beside about 100,000 Jews and 6,000 gypsies, scattered or wandering over the country.—The shape of France is an irregular hexagon, the sides of which might be drawn respectively along the English channel, the Atlantic, the Pyrénées, the Mediterranean, the Alps, and the Rhine, the last side running from this river to the North sea. The first of these sides, or the N. W. coast, presents from Dunkirk to the mouth of the Somme a succession of sandy downs from which project Capes Gris Nez and Blanc Nez, opposite Dover. At the mouth of the Somme is the small bay of St. Valery. From this point, sweeping S. W. toward the mouth of the Seine, the coast is characterized chiefly by cliffs of chalk and marl, with here and there harbors, the most important of which is Dieppe. The Seine now widens into a small bay, bearing the name of Seine, Havre, or Calvados, from which the coast line runs almost due W., fringed by a chain of reefs, to the mouth of the Vire, whence it takes a N. direction and forms the square-shaped peninsula of Cotentin. On the N. face of this peninsula, between Capes Barfleur and La Hague, lies the magnificent port of Cherbourg. From Cape La Hague, a low shelving shore, interrupted by

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granitic cliffs, runs southward to the bay of Cancale, the sandy bottom of which is dry at ebb tide. The coast then resumes its westerly direction to form the triangular peninsula of Brittany, the rocky cliffs of which present a wild, grand, and desolate aspect. Beside the bay of Cancale, Brittany is washed by the St. Malo roads and the bay of St. Brieuc. Its extremity, Cape St. Mathieu or Finistère, runs into the Atlantic, and is the westernmost point of France. The coast is here deeply indented by a magnificent bay, capable of containing at least 500 ships of war, which receives its name from the important military seaport of Brest, and by the less sheltered bay of Douarnenez, which is separated from the former by the peninsula of Crozon. From the point which projects S. of the bay of Douarnenez, the coast, gradually declining and becoming sandy again, recedes E. S. E. toward the mouth of the Loire, presenting in succession Cape Penmark, the small peninsulas of Quiberon and Sarzean, the roads of Lorient, and the bay of Croisic. From the Loire to the Gironde, the shore, continning low and sandy, is indented by several bays, generally protected by islands, and presents the two seaports of La Rochelle and Rochefort. From the mouth of the Gironde to the foot of the Pyrénées, the coast is bnt an unbroken line of sandy downs interspersed with marshes, the only opening to vessels being the basin of Arcachon. Drifting sands have here covered large tracts of good soil, and within the last two centuries a number of scattered cabins, private residences, convents, and even whole villages, have been thus completely buried. Of late years such ravages have been partially stopped by the planting of beach grass, broom, and pine trees. Along the Atlantic division, which is 585 m. in length, there are many islands, including Ushant (Onessant) on the extreme point of Brittany, Belleisle, nearly opposite the mouth of the Loire, Noirmoutiers, Dieu, Ré, and Oleron, between that river and the outlet of the Gironde. At the entrance of the English channel, near the Cotentin peninsula, 3 important islands, Jersey, Guernsey, and Alderney (Aurigny), although physically belonging to France, are held by Great Britain. The coast of the Mediterranean, 370 m. long, recedes first toward the N. E. in a semicircular curve to the mouth of the Rhone, and forms what is improperly called the gulf of Lyons (Fr. *golfe du Lion*); bold and rocky near the Pyrénées, it soon lowers into a sandy beach, intersected by a number of lagoons, snch as those of Thau and Valcarès, but without a single good harbor. It is everywhere bordered by shoals, and the accumulation of land is such as to require constant attention to prevent the filling up of the few indifferent ports which are to be found here. Aigues-Mortes, which was formerly an accessible port, is now nearly 5 miles from the sea. Agde, notwithstanding works of improvement, affords protection only to a few barks, and Cette admits only vessels of the smallest size. Beyond the mouth of the Rhone, the shore, rising up in bold cliffs, abounds in good ports, the principal of which are Marseilles and Toulon, both of the highest importance, the former on account of its large and always increasing trade with Algiers and the East, the latter as a naval and military station. The land frontiers, as we have said, are but partly formed by physical boundaries. On the S. the dividing line follows the ridge of the Pyrénées, with one or two deviations too trifling to be noticed, and ends with the lower Bidassoa. On the E. the Rhine from Basel to the mouth of the Lauter divides France from the grand duchy of Baden. Toward Switzerland, the frontier, running S. S. W., starts from the great bend of the Rhine, follows the Doubs to its falls, then a ridge of the central Jura to Mount Rixon, and finally the Laudon to its mouth in the Rhone. This river in part separates France from Savoy; then the dividing line winds its way to the Alps, follows the Cottian Alps and the northern ridge of the Maritime Alps to the Var, and ends with this river on the Mediterranean. The conventional line on the N. E. starts in a S. E. direction from the North sea, 4 miles E. of Dunkirk, reaches the Lys, which it follows down for a few miles, crosses this river at Menin, runs S. E., passing a few miles N. of Lille, Valenciennes, and Maubeuge, crossing the Scheldt and the Sambre, recedes S. of Philippeville and Marienbourg, then runs N. toward the Meuse, which it crosses below Charlemont; then resuming its winding course to E. S. E. it runs a few miles N. of Mézières, Sedan, Montmédy, and Thionville; then after crossing the Moselle N. of this last city, the Sarre near Sarreguemines, the Vosges N. of Bitche, it follows the Lauter to its fall into the Rhine. This open line is protected by a series of strongholds and fortified towns, the principal of which have been here mentioned.—Beside the two great mountain chains which form the boundaries of France toward Spain and Italy, several others of minor importance, belonging to the Alpine and Pyrenean systems, intersect the country. The principal of these chains, which is but a part of the great European watershed, starts from the Pyrénées, taking first a winding course E. N. E. nearly parallel to the Mediterranean shore, then setting up northward, under the names of Black mountains, Cévennes, and Côte d'Or; near lat. 48°, where it is called the plateau of Langres and Monts Faucilles, it makes a curve eastward, and then branches, projecting northward the Vosges, and southward various ridges which, through the Jura, connect with the Alps. This chain thus divides France into two very unequal parts, the greater sloping toward the Atlantic and the English channel, the smaller toward the Mediterranean. Four ranges, the general direction of which is N. W., branch off from this watershed and separate the basins of the various rivers flowing into the above seas: 1, the hills known as the eastern Ardennes; 2, the western Ardennes, connecting with those of Picardy and Artois; 3, the branch consisting of the Morvan

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mountains, the hills of the Orleans forest, of lower Normandy, and Monts d'Arrée, running along the N. shore of Brittany; 4, the mountains of Auvergne, which may be more properly called a cluster, of which the hills of Limousin and Poitou are but the continuation. The Pyrénées also send some secondary ramifications through the S. W. The highest summits of this great chain within the limits of France are the Pic du Midi de Bagnéres, the Pic Long, the Tours de Marboré, Mts. Taillon and Vignemale, the Pic du Midi de Pau, and Mt. Canigou, whose summits are from 9,000 to 10,000 feet above the sea; but the most elevated, such as Mts. Perdu, Posets, and Maladetta, are to be found in Spain. In the Cévennes ridge, Mts. Mézin and Lozère are about 6,000 feet high. The Reculet and the Dole tower over the ranges of the Jura to about 5,000 feet. Among the rounded summits of the Vosges, which are known under the name of "ballons," the only one deserving notice is the Ballon d'Alsace, in the southern part of this chain. The group of Auvergne presents the Puy de Dôme, Mt. Dore, and the Plomb du Cantal, rising to a height of nearly 5,000 feet. The loftiest summit is to be found in the Alps: Mt. Pelvoux reaches an elevation of nearly 13,000 feet; next to it come Mts. Genèvre and Viso. On an average, the mountains of France are comparatively low.—The great W. slope of France is divided into 3 parts, one inclined toward the North sea, another toward the English channel, and the third toward the Atlantic. The first is drained by 3 rivers: the Rhine, which scarcely belongs to France, since it merely runs for about 100 m. along a portion of its E. frontier, and receives the Moselle; the Meuse, which flows in a northern direction, between the E. and W. Ardennes; and the Scheldt; the last two are properly Belgian. The Somme, the Seine, the Orne, the Vire, and the Rance flow into the English channel. The Seine rises at St. Seina, at the foot of the Côte d'Or, runs in a N. W. direction, flows in its sinuous course past Troyes, Paris, Ronen, and other cities, receives on its left the Yonne, and on its right the Aube, the Marne, and the Oise, and falls into the sea at Havre. The Atlantic receives the Blavet, the Vilaine, the Loire, the Sèvre-Niortaise, the Charente, the Gironde, and the Adour. The Loire, which is the largest river and waters the most central part of the country, rises in the Cévennes, at Mt. Mézin, runs generally N. W. as far as Orleans, and thence mostly W. S. W. with a somewhat tortuous course to its mouths. It receives on the right the Nièvre, and further down the Mayenne, which, after being joined by the Sarthe, assumes in its lower part the name of Maine; on the left, the Allier, the Cher, the Indre, the Vienne swollen by the confluence of the Creuse, and the Sèvre-Nantaise. The Loire and its tributary streams, particularly those from the south, roll down immense quantities of gravel and sand, which, continually shifting, render the navigation difficult and dangerous. A great dike, called the "Levée of the Loire," the origin of which is lost in antiquity, bounds the course of the river on the right bank from Blois to Angers; this vast work is generally about 25 feet high and 40 broad. The Garonne, which has its source in the valley of Aran, in Catalonia, follows one of the passes of the Pyrénées, flows N. E. until it reaches Toulouse, then turns toward the N. W. and becomes navigable; it receives the Tarn and the Lot, which run E., passes Bordeaux, where it is half a mile wide, and meeting the Dordogne a few miles below this city, takes the name of Gironde, forms several islands, and falls into the sea by two channels. The navigation between Bordeaux and the sea is impeded by many shoals; the tide flows up about 80 m., and is sometimes preceded by a huge billow that sweeps destructively along the shore. This phenomenon is called the *mascaret*. The Adour, rising in the Pyrénées, has a semi-circular course toward the bay of Biscay, into which it enters after receiving numerous mountain streams. The E. slope, which is inclined S. toward the Mediterranean, is enclosed between the Jnra and the Alps on one side, the Côte d'Or and the Cévennes on the other. It is drained almost entirely by the Rhone and its branches. The Rhone is not very wide, and runs generally with the impetuosity of a torrent. It reaches France after issuing from the lake of Geneva, runs S. and forms part of the French frontier line, then makes a bend westward, joins the Saône at Lyons, and flows S. to the Mediterranean, into which it discharges itself by several branches, forming a delta. It is joined on the left by the Isère, which comes from Savoy, the Drome, and the rapid Durance, which rises in the Alps. The few lakes which France contains scarcely deserve the name; the largest is that of Grand Lieu, near the mouth of the Loire; the most picturesque are those of Gerardmer in the Vosges, and Nantua in the southern part of the Jnra.—The general aspect of the interior of France is agreeably diversified. The banks of the Seine present pleasant landscapes, with fertile and well cultivated fields. Those of the Loire have few attractions in the upper part of its course, but are beautiful below Orleans; the neighborhood of Tours has been characterized as the "garden of France." The valley of the Garonne is covered with those rich vineyards which send their produce to all parts of the world. The lower Rhone is remarkable for picturesque grandeur. The Auvergne mountains, the Pyrénées, the Vosges, the Jura, and the Alps, abound in fine scenery. Brittany is partly covered by wide heaths and naked rocks.—The geological outline of France is easily marked. A belt of the granitic rocks running through the Vosges, the Alps, the Pyrénées, and the peninsula of Brittany, forms a kind of basin, in the centre of which a pile of the same formation rises. This consists of the Auvergne mountains, which, being mostly composed of granite, gneiss, and mica-

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ceous schists, bear abundant traces of recent volcanic activity; extinct craters, lava streams, &c., present an interesting field for the observations of the geologist. The primary rocks at the circumference are of the greatest diversity, the granite however predominating at the extremity of the peninsula of Brittany. The intervals between the external belt and the central nucleus are mostly filled up by secondary formations, interspersed with tertiary deposits. Both are interesting. The former, which are calcareous or marly and generally compact, contain a vast number of shells, madrepores, and other organic remains; stretching in long hill ranges, of little elevation, they run through Lorraine, Burgundy, Franche Comté, Dauphiné, and Languedoc. Many are steep and bare, or covered only by a thin vegetable soil; but some, the hills of the Côte d'Or especially, are admirably suited for the vine. The most remarkable tract of tertiary formations is known as the "Paris basin;" a larger one covers nearly the whole of the valleys of the Garonne and the Adour, while several others of smaller extent are found in the valleys of the Rhine, the Loire, and the Allier. These are mostly calcareous, enclosing great quantities of shells and the remains of fossil mammalia of large size. The district around the mouth of the Rhone is entirely alluvial.—The soil of France, taken as a whole, is of superior quality; and the productive part of it bears a larger proportion to the entire extent of the country than in most other European states, amounting to 41,850,000 hectares out of 52,768,600. The whole may be distributed in the following manner: arable lands, 25,500,000; meadows, 4,830,000; vineyards, 2,130,000; orchards and gardens, 640,000; miscellaneous crops, 950,000; copse wood, 7,800,000; heath land, 7,789,000; ponds, 209,000; roads, rivers, canals, houses, &c., 2,920,000.—The climate, being on the whole temperate, is one of the finest in Europe; it is however greatly diversified by the differences of latitude, elevation, soil, exposure, &c. In this respect, France has been divided into 4 regions, each being characterized by a special production: the 1st, the region of the cereals, extends from the northern frontier to a line drawn from Mézières to Nantes; the 2d, the region of the vine, is comprised between this line and another passing from Strasbourg to the mouth of the Charente; the 3d, through which the cultivation of maize prevails, is bounded S. by a line extending from Grenoble to Perpignan; and the 4th, the region of the olive, includes the most southern part of the country. The air is generally pure and healthy. The mean annual temperature of different parts of France has been estimated as follows by Humboldt: at Toulon, 62°; at Marseilles, 59.5°; at Bordeaux, 56°; at Nantes, 55.2°; at Paris, 51.2°; and at Dunkirk, 50.5°. More rain falls annually in the valley of the Rhone than on the Atlantic slope; the average fall in the former being about 30 inches, while it does not exceed 20 inches in the latter. The centre of the country enjoys a happy medium of temperature and climate; in the S. the summers are long, dry, and hot. The mountainous region of Auvergne is visited by long and severe winters. The departments around the gulf of Lyons are subject to disagreeable winds, which sometimes prove injurious to the crops; the most dreaded is the *mistral*. Of the vegetable products the most generally cultivated are wheat, rye, maize, buckwheat, oats, barley, potatoes, colewort, black poppy, the olive, &c. The average yield of wheat amounts to 225,000,000 bushels; rye, 83,000,000; oats, 140,000; barley, 50,000,000; potatoes, 250,000,000. The chief grain-growing districts are the departments of Eure-et-Loir (formerly Beauce), Aisne, Nord, Meurthe, Moselle, Seine-et-Marne, Seine-et-Oise, Seine-Inférieure, Somme, and Pas-de-Calais. Barley, oats, oleaginous seeds, hops, and beet root are mostly cultivated in the department of Nord; buckwheat in Brittany. Meadows and pastures are principally found in Normandy. The vineyards, which extend through no fewer than 76 departments, yield annually about 900,000,000 gallons of wine, worth about $160,000,000 at the places of production; nearly the 4th part of this amount is exported. Apple trees are abundant in the N. W., and the Normandy cider enjoys a wide reputation in France; hemp and flax are raised in large quantities in the same region; attention is given to the mulberry tree in the S. and S. E.; madder is successfully cultivated in the E. on the banks of the Rhine and the Durance; tobacco is raised in the departments of Nord, Pas-de-Calais, Gironde, Bas-Rhin, Ille-et-Vilaine, Lot, and Lot-et-Garonne. The principal forest trees are the chestnut on the central mountains, the oak in the Pyrénées, the fir in the Landes. The most richly wooded districts are the Ardennes table land, the Vosges, the plateau of Langres, the Côte d'Or, the Cévennes and their ramifications, the Jura, and the Alps. The destruction of wood has been considerable within the last two centuries, and the forests do not cover more than $\frac{1}{6.5}$ of the whole area of the country. The principal forests still in existence are those of Compiègne, Fontainebleau, L'Esterel, Haguenau, Rambouillet, Villers-Cotterets, Orleans, &c. The French flora comprises upward of 830 genera and 6,000 species. —France is far from being so well stocked with domestic animals as she ought to be, considering her extent and the nature of her soil. The numbers of live stock in 1854 were as follows: horned cattle, 9,939,828; sheep, 32,151,430; horses, 2,818,493; mules and donkeys, 787,360; total, 45,697,111, to which about 5,000,000 swine must be added. This insufficiency of stock is yearly supplied by importation. Within the last 40 years great attention has been given not only to the improvement of native breeds, but to the introduction of foreign ones, which has been generally successful. The best breeds of cattle are those of Auvergne and Gascony;

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the sheep of Berry are considered the finest; the fattest swine are raised in Alsace, Lorraine, and the Pyrénées; the horses of Limousin, Brittany, Perche, and Normandy are renowned, those of the last two provinces for their strength and size; the mules of Poitou deserve the same praise. Poultry, which contributes one of the principal articles in the husbandry of France, is raised with peculiar success in Maine, Angoumois, and Burgundy. Eggs are important articles of export, especially to England. Bees are principally raised in the departments bordering on the Mediterranean; the most celebrated honey is that of Narbonne. The wild animals are fast diminishing all over the country, owing to the progress of population; the black bear is confined to the higher ranges of the Alps and the Pyrénées, where the isard, chamois, and wild goat are also found. The lynx appears rarely in these mountains and the Cévennes. Wolves, notwithstanding the active war of extermination carried on against them, are still numerous in some central departments, especially the mountainous districts. The wild boar, roebuck, and fox abound in all well wooded parts. The red and fallow deer are becoming rare, while hares and rabbits are abundant. Several kinds of squirrels, the polecat, weasel, marten, hedgehog, and other small animals, are common. Otters and a few beavers are found in some of the southern streams. Reptiles are few; a venomous kind of viper and a harmless adder are to be found in some regions. Among the birds, which are very numerous, are eagles, vultures, falcons, &c. The rivers and coasts generally abound with fish; fisheries are consequently an important item, and a great source of wealth. Cancale and Marennes furnish excellent oysters. The pilchard fishery, which is conducted mostly on the shores of Brittany, is the most important of all; about 8,000 barrels of salted pilchards are sent into the market annually, and the inhabitants on the coast live in great part on fresh pilchards during the season. The herring fishery, the headquarters of which are at Dieppe, has also some importance, as well as the sole, ray, and mackerel fisheries. The tunny fishery, much less productive, is pursued on the shores of the Mediterranean. The coasting fisheries, which employ 28,000 hands and 7,000 boats, bring about $3,000,000 a year to the country. Dunkirk, Boulogne, St. Valery-sur-Somme, Dieppe, Fécamp, and St. Malo send yearly a number of ships which engage in the herring, mackerel, cod, and whale fisheries.—The mineral wealth of France is at once large and diversified, although gold and silver are to be found in but very small quantities. The former appears in some small streams flowing from the Pyrénées; a few mines of the latter are wrought, but with little profit; while the precious metal is extracted in larger quantities from lead and copper ores. Large beds of iron ore are found in nearly all parts of France; they are mostly wrought in the departments of Ardeunes, Haut-Rhin, Moselle, Haute-Marne, Haute-Saône, Isère, Eastern and Lower Pyrénées, Ardèche, Aveyron, &c. They yield annually about 680,000 tons, and give employment to about 15,000 hands. Marble, porphyry, granite, alabaster, and crystals are found in nearly all the mountains; slate in the Ardennes, Maine-et-Loire, and Finistère; building stone of various kinds everywhere. The number of quarries in working order is estimated at 22,000, giving employment to over 80,000 hands. Coal beds of various kinds are also numerous, and within the last 25 years considerable progress has been made in the working of mines. The most productive are to be found in the departments of Nord, Loire, Saône-et-Loire, Aveyron, &c., and their annual yield is about 2,000,000 tons. Salt mines are worked in the departments of Meurthe, Moselle, Haute-Saône, Doubs, Jura, Ariège, and Basses-Pyrénées, while salt marshes exist along nearly the whole of the sea coast. The produce of both amounts to nearly 1,200,000,000 lbs. annually. Lead is extensively scattered through the mountainous districts, especially in Brittany. Copper is abundant in the Pyrénées, Alps, and Vosges. Together with these metals, zinc, cobalt, and manganese are found. Alum is gathered in Haut-Rhin, Aisne, Oise, and Aveyron. The mineral springs, which are about 860 in number, are divided into cold and hot, ferruginous, gaseous, sulphureous, and salt waters; the most renowned are those of Aix, St. Amand, Bagnères, Balaruc, Barèges, Bourbon-Lancy, Bourbonne-les-Bains, Cauterets, Eaux-Bonnes, Forges, Mont Doré, Plombières, Vichy, &c.—France is essentially an agricultural country, whether we take into consideration the extent of lands under cultivation or the number of hands employed in it. Out of her whole area, 54 per cent. is given to agriculture. The whole agricultural population, amounting to 20,351,628, as before mentioned, is distributed as follows: proprietary farmers, 7,159,284; tenant farmers, 4,000,348; day laborers, 6,122,747; servants, 2,748,263; woodmen, 320,986. This population works upon a capital which has been assessed at $8,935,390,000, thus divided: lands and buildings, $7,877,430,000; implements and furniture of farms and houses, $631,750,000; cattle, horses, &c., $426,220,000. The annual gross income of the above capital is estimated at about $1,700,000,000. This has been increasing at a rapid rate; during the 18th century it scarcely reached $300,000,000; under Napoleon I. it swelled to about $600,000,000, and has thus nearly trebled in less than 50 years. This result may be said to have been obtained more through the abundant resources of the country than by improvements in husbandry. It is indeed only within late years that the new methods of culture which have proved so successful in England and elsewhere have been tried in France upon a large scale. The small farmers show unreasonable repugnance to any departure from their traditional system; and many of them still stubbornly adhere to old erroneous

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notions, which can only be dispelled in the course of time by the example and success of their more enlightened neighbors. The minute subdivision of landed property, and the small capital which each one has at his disposal, are also hindrances in the way of rapid improvement. —The weights and measures now used in France were introduced soon after the first revolution, and the use of the old is forbidden by law, although the old names are retained, the values which they express being calculated by the new standard. The unit of length is $\frac{1}{10,000,000}$ of a quadrant of the meridian, or distance from the equator to the north pole, and this quadrant, as ascertained by MM. Delambre and Méchain by measuring an arc of the meridian between the parallels of Dunkirk and Barcelona, is equal to 32,808,992 English feet. The unit of length, or *mètre*, is therefore about 39.37070 English inches. From the metre all other measures are derived by a system of decimal multiplication and division, and their names are formed on the simple principle of adding a Greek prefix when the measure is a multiple of the metre, and a Latin prefix when it is a fraction. Thus, a decametre = 10 metres, a hectometre = 100 metres, a kilometre = 1,000 metres, a myriametre = 10,000 metres; and a decimetre = $\frac{1}{10}$ of a metre, a centimetre = $\frac{1}{100}$, a millimetre = $\frac{1}{1,000}$. The unit of square measure is the *are* or square decametre (100 square metres) = 119.6033 square yards, or about $\frac{1}{4}$ of an acre. The unit of solid measure is the *stère*, or cubic metre = 35.3166 cubic feet; that of liquid measure is the *litre* or cubic decimetre = 61.02705 cubic inches, or nearly $\frac{1}{4}$ of an imperial gallon. The unit of weight is the *gramme*, which is the weight of a cubic centimetre of distilled water at its temperature of greatest condensation. It is equal to 15.4325 grains troy, or about $\frac{1}{28}$ of a dram avoirdupois. The compounds of these weights and measures are formed and named on the same principle as those of the metre. The monetary unit is the *franc* (silver), which weighs 76.5 grains, and is worth about 19.2 cts. U. S. currency. Its fractions are the centime = $\frac{1}{100}$ of a franc, and the decime = $\frac{1}{10}$ of a franc.—Manufactures, although like agriculture laboring, as a general rule, under the want of large capital, have been progressing steadfastly; and as respects the extent and value of her products, France ranks as a manufacturing country next to Great Britain. While she can scarcely enter into competition with the latter in the manufacture of cotton goods and several other valuable articles, she excels her and other countries in nearly all those requiring particular taste and elegance. French industry is the ruler and great purveyor of fashion. Her silk goods hold the most prominent place in this respect. The number of silk looms amounts to over 80,000, employing 170,000 workmen, and producing goods worth over $50,000,000, to which must be added about $16,000,000 worth of ribbons manufactured at St. Étienne. This place, Lyons, Avignon, Nimes, Tours, &c., are the principal seats of this important and truly national manufacture, the excellence of which is sufficiently proved by the fact that $\frac{1}{3}$ of its products are exported. The manufactures of jewelry and bronze goods amount annually to over $13,000,000; their principal seat is Paris. The capital is also the great centre of the fabrication of surgical and philosophical instruments, books, and what is especially called *l'article-modes*. The publishing business is also carried on with some activity in Lyons, Tours, and several other large cities. Lace, tulle, and embroideries are mostly manufactured in and aronnd Nancy, St. Quentin, and Metz. Iron works, over 800 in number, employing 40,000 workmen, are to be found in various parts of France, and particularly in Nièvre; the product of pig iron has been on the increase, and is now estimated at 600,000 tons, worth about $20,000,000; that of wrought iron is about 400,000 tons, valued at $36,000,000. The making of cutlery, which employs 60,000 workmen, is principally carried on at Paris, Langres, Châtellerault, Moulins, and Thiers; hardware is produced at the same places, as well as St. Étienne, Strasbourg, Charleville, &c. There are manufactories of fine porcelain and earthenware at Sèvres, Limoges, Nevers, Montereau, and Sarreguemines, the products of which amount to $6,000,000 a year; the porcelain of Sèvres is much and justly esteemed. About 10,000 hands are employed at watchmaking in and around Besançon, Montbéliard, Pontarlier, and Versailles. Leather is manufactured to the value of $36,000,000, of which $1,400,000 worth is for gloves. The woollen manufacture is of paramount importance; its chief seats are Sedan, Louviers, and Elbeuf, for cloths; Vervins, Rheims, Amiens, Arras, St. Omer, Roubaix, and Tourcoing, for flannels and other coarse stuffs; Paris, Beauvais, and Aubusson, for carpets; the total value of woollen fabrics is estimated at nearly $90,000,000. The cotton manufacture, employing no fewer than 170,000 workmen, amounts, including all kinds of fabrics, to nearly $120,000,000 a year. It is mostly carried on in the departments of Haut and Bas Rhin, Nord, Aisne, and Seine-Inférieure. Linens are manufactured principally in the N. provinces. St. Quentin, Valenciennes, and Cambrai produce the best cambrics; Lyons and Alençon, the best muslins. Mirrors of superior quality are manufactured at St. Gobain, St. Quirin, and Cirey; other glass wares of various kinds give employment to 10,000 hands, distributed in 230 establishments, the annual product amounting to nearly $5,500,000. There are about 300 sugar houses for the manufacture of beet root sugar, giving an annual product of 150,000,000 lbs. Shipbuilding is principally carried on at Cherbourg, Brest, Rochefort, Marseilles, Toulon, and Bordeaux.—The great articles of export consist of silk, woollen, and other manufactured goods, wines and brandies, joiners' and cabinetmakers' wares, leather, bronze, steel, and iron wares, paper, refined sugar, china, earthen and glass wares;

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while the imports comprise all sorts of colonial produce, cotton, wool, sugar, coffee, spices, dyestuffs, raw silk, woollen, hemp, flax, coal, copper, cattle, hides, &c. These are mostly brought to Marseilles, Havre, Bordeaux, Nantes, La Rochelle, Dunkirk, Boulogne, St. Malo, Lorient, Bayonne, Cette, &c., which are also the outlets of exportation. The following tables, compiled from recent official publications, show the official and actual values of the commerce of France, distinguished as "general" and "special"—the former term comprehending all the imports and exports, and the latter only the imports for domestic consumption and the exports of French produce and manufactures. The official value is that fixed by law in 1826. The sums are given in millions of francs.

GENERAL COMMERCE.

Years.	Official value.			Actual value.		
	Imports.	Exports.	Total.	Imports.	Exports.	Total.
1850.....	1,174	1,581	2,705	1,051	1,419	2,470
1851.....	1,158	1,629	2,787	1,094	1,520	2,614
1852.....	1,433	1,682	3,120	1,392	1,680	3,072
1853.....	1,632	1,861	3,493	1,696	2,033	3,729
1854.....	1,709	1,788	3,497	1,870	1,886	3,756
1855.....	1,902	2,027	3,979	2,160	2,167	4,327
1856.....	2,268	2,320	4,588	2,740	2,659	5,399
1857.....	2,236	2,357	4,593	2,689	2,639	5,328
1858.....	...	...	...	2,164	2,563	4,727

SPECIAL COMMERCE.

Years.	Official value.			Actual value.		
	Imports.	Exports.	Total.	Imports.	Exports.	Total.
1850.....	757	1,124	1,881	781	1,011	1,792
1851.....	791	1,289	2,080	781	1,119	1,900
1852.....	1,007	1,251	2,258	1,006	1,278	2,284
1853.....	1,123	1,486	2,609	1,217	1,572	2,789
1854.....	1,158	1,261	2,419	1,291	1,413	2,704
1855.....	1,866	1,443	2,998	1,594	1,558	3,152
1856.....	1,538	1,650	3,188	1,989	1,898	3,889
1857.....	1,484	1,606	3,190	1,872	1,865	3,737
1858.....	...	...	...	1,561	1,891	3,452

These figures do not include the imports and exports of gold and silver, which were as follows in 1858—the values being expressed in francs:

Precious metals.	Imports.	Exports.
Gold.....	583,000,000	166,500,000
Silver.....	100,600,000	175,600,000
Total.....	693,600,000	242,100,000

The average yearly movement of specie for the 10 years ending with 1858 was as follows:

Precious metals.	Imports.	Exports.
Gold.....	429,250,000	94,010,000
Silver.....	178,279,500	214,730,000
Total.....	617,517,500	308,780,000

It will thus be seen that France has been greatly enriched with the precious metals during this period, the average annual excess of imports over exports being 308,787,500 francs. The following tables show the principal articles of special commerce:

IMPORTS.

Articles.	1856.		1857.		1858.
	Quantity.	Value, francs.	Quantity.	Value, francs.	Value, francs.
Corn.....qrs.	2,859,212	303,800,000	1,859,911	116,200,000	46,200,000
Flour.....tons,	83,830		11,183		
Sugar, colonial..... "	93,531	77,600,000	84,961	67,000,000	72,000,000
" foreign..... "	32,898	29,300,000	17,660	45,100,000	29,300,000
Wines and spirits.....galls.,	11,667,948	53,500,000	22,193,269	84,100,000	11,700,000
Coal.....tons,	3,915,519	55,000,000	4,205,721	80,800,000	51,500,000
Cattle.....no.,	608,635	56,000,000	625,396	52,900,000	40,900,000
Rice.....tons,	67,446	34,500,000	95,611	36,600,000	12,100,000
Copper..... "	21,329	29,900,000	11,093	26,100,000	31,500,000
Coffee..... "	23,222	32,500,000	26,740	33,175,000	37,100,000
Iron, pig, bar, and rod..... "	120,968	40,400,000	117,697	28,500,000	11,700,000
Zinc..... "	19,138	12,400,000	25,499	17,500,000	15,600,000
Lead..... "	25,928	15,100,000	20,478	12,900,000	12,600,000
Silks.....	....	226,700,000	....	211,100,000	208,500,000
Cotton.....	....	146,600,000	....	148,400,000	145,500,000
Wool.....	....	128,700,000	....	116,500,000	103,500,000

EXPORTS.

Articles.	1856.		1857.		1858.
	Quantity.	Value, francs.	Quantity.	Value, francs.	Value, francs.
Tissues of cotton, silk, woollen, and linen.....tons,	20,375	726,400,000	20,796	698,500,000	615,400,000
Wines and spirits.....galls.,	31,303,739	268,200,000	26,293,958	214,300,000	282,400,000
Gloves and leather, made up .....tons,	2,803	70,300,000	2,585	80,800,000	106,900,000
Prepared leather ..... "	.....	44,100,000	.....	51,000,000	
Dressed " ..... "	4,296	8,900,000	4,467	7,800,000	.....
Metal work ..... "	11,877	40,900,000	12,911	41,200,000	44,700,000
Silk, raw and dyed..... "	493	39,400,000	474	38,300,000	29,500,000
Sugars, refined ..... "	85,766	85,800,000	82,989	82,600,000	49,800,000
Glass..... "	30,490	18,700,000	30,605	20,000,000	17,600,000
Books, engravings, and music	.....	20,000,000	.....	18,900,000	17,500,000
Madder .....tons,	16,069	17,100,000	12,023	15,400,000	13,900,000
Cattle .....no.,	124,822	14,800,000	147,498	15,200,000	16,000,000
Paper .....tons,	8,354	14,200,000	8,853	15,000,000	12,200,000
Porcelain and pottery ..... "	11,019	11,400,000	12,052	11,600,000	10,000,000
Grain.....qrs.,	67,706	7,600,000	85,781	10,200,000	128,700,000
Flour .....tons,	8,876		14,508		

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The following table represents the special commerce of France with the countries most largely interested in her trade in 1856, the actual values being given in francs:

Countries.	Imports.	Exports.
Great Britain and her colonies	$44,800,000	$88,600,000
United States	222,800,000	223,600,000
Belgium	203,700,000	182,100,000
Spanish possessions	121,000,000	120,500,000
Turkey and Egypt	150,600,000	93,500,000
Sardinia and Monaco	128,800,000	84,200,000
Germany	110,000,000	69,700,000
French colonies	119,500,000	74,700,000
Algeria	89,200,000	108,400,000
Switzerland	59,000,000	86,500,000
Russia	95,000,000	31,700,000
Brazil	21,600,000	53,800,000
British India	64,300,000	7,200,000
Tuscany and Lucca	18,900,000	24,500,000
Chili	8,700,000	31,900,000
Peru	16,300,000	23,200,000
La Plata	13,400,000	19,000,000
Hanse towns	10,900,000	17,600,000
Austria	2,400,000	6,200,000
Norway	21,100,000	3,100,000
Barbary states	17,900,000	5,000,000
Mexico	3,400,000	19,500,000

The total value of imports into France from the United States during the year ending June 30, 1858, was $32,741,917, of which $31,891,807 was in American vessels; and the exports from France to the United States during the same period amounted to $35,292,521, of which $31,172,291 was in American vessels. The imports from Great Britain into France of British and Irish produce and manufactures were valued at $31,066,790 in 1857, and $24,307,790 in 1858. By a comparison of figures it appears that during the decennial period from 1847 to 1857 the total of imports and exports increased over 75 per cent., and that the increase of exports was greater than that of imports, having been 83 per cent., while the latter was 70 per cent. It must be remarked, however, that the imports fell off greatly in consequence of the revolution of 1848, while the exports scarcely felt the shock. The ratio of increase for 30 years may be seen from the following figures, representing the average annual general commerce, including specie movements for 3 decennial periods:

Years.	Imports.	Exports.
1827–'37	848,300,000 fr.	768,000,000 fr.
1837–'47	1,259,500,000	1,099,500,000
1847–'57	1,831,000,000	1,590,800,000

The movements of shipping in 1856 and 1857 were as follows:

ENTERED.

Character.	1856.		1857.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
French	10,312	1,248,086	10,971	1,686,917
Foreign	15,361	2,820,695	14,755	2,434,860
Total	25,673	4,068,781	25,726	4,121,777

CLEARED.

Character.	1856.		1857.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
French	5,950	1,092,125	7,011	1,218,822
Foreign	8,383	1,255,355	8,967	1,376,344
Total	14,333	2,307,490	15,977	2,590,166

The subjoined table represents the condition of the French merchant marine in 1857:

	Vessels.	Tonnage.
Under 100 tons	9,732	262,932
Between 100 and 500 tons	2,786	600,940
Over 500 tons	206	133,077
Total	12,724	995,996

The number of vessels has remained nearly stationary for the last 30 years, although a gain has been made in capacity of about 80,000 tons. The amount of transportation increased 48 per cent. between 1847 and 1856. About 30 per cent. of the foreign trade is carried on by land. The coasting trade of France is very large. There are 242 ports, the principal of which, in the order of their importance in this branch of commerce, are Marseilles, Havre, Bordeaux, Rouen, Arles, Honfleur, Charente, Dunkirk, Cette, Libourne, and Plagne. The amount of coasting trade in 1856 was 2,432,813 tons, of which 1,734,427 belonged to ports on the Atlantic and 698,386 to ports on the Mediterranean. The trade between ports of one sea and those of another, called the "great coasting trade," employed 108,439 tons.—France is now completing an admirable system of railways, which will be equal, if not superior, to any other in Europe or America. Paris is the central starting point of these roads, which, running in every direction, place the metropolis in direct communication with nearly all parts of the empire. They may be divided into the following great lines, each of them sending off numerous branches: 1, the northern railway, leading to the N. E. frontier, where it connects with the Belgian roads; 2, the eastern or Strasbourg, by Meaux, Châlons-sur-Marne, and Nancy, to the banks of the Rhine; 3, the south-eastern or Mediterranean, passing through Fontainebleau, Dijon, Lyons, and Avignon, to Marseilles; 4, the Orleans, which branches at Orleans into the central railway, which runs in a S. direction, and the south-western or Bordeaux, which first follows the Loire, and then running from Tours to Bordeaux, terminates at Bayonne, connecting with the Spanish lines; 5, the western, connecting the metropolis with the seaport of Brest, through Versailles, Le Mans, and Rennes; 6, the north-western or Havre, traversing the valley of the Seine. Two other lines of great importance start from Bordeaux: one, the southern, completed in 1857, connects this city with the Mediterranean at Cette; the other, yet unfinished, will create direct communication between Bordeaux and Lyons, under the name of the great central. The aggregate length of the above railways, either completed or constructing, is about 8,440 miles. France is well provided with common roads, which are divided into imperial, departmental, and communal roads, the cost of each class being respectively defrayed by the government, the departments, or the communes to which they belong. The first class of these thoroughfares, 214 in number with an aggregate extent of about 22,000 miles, are wide highways, paved or macadamized, and bordered with flue trees; the de-

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partmental roads are tolerably good, but the communal are indifferent, and too often out of repair, as they are not like the others under the charge of civil engineers appointed by the government. The canals, 79 in number, have an aggregate length of 3,600 miles; among the principal are: the southern canal (*canal du midi*), which runs from Cette to Toulouse, where it joins the Garonne, and thus connects the Mediterranean with the Atlantic; the canal of Burgundy, between the Yonne and the Saône, and the canal of the Rhine and Rhone, connecting these two rivers; the canal of the centre, between the Loire and the Saône; the Loing, Briare, and Orleans canals, opening a communication between the Seine and the Loire; the St. Quentin canal, which is remarkable for its tunnel, and connects the Oise with the Scheldt; the canal of Brittany, the longest of all, running from Nantes to Brest, a distance of 230 miles. The aggregate length of land and water communications in the interior of France is reckoned at 547,500 miles. The railways, highways, and canals are placed under the superintendence of a special department known as the board of engineers of bridges and public ways (*ingénieurs des ponts et chaussées.*) Each department has its chief engineer; and the departments are divided into 16 circuits under the control of division inspectors.—The present government of France, as established by the constitution of Jan. 14, 1852, is virtually an absolute monarchy, the head of which is styled emperor; the crown has been declared hereditary in the male line of the Bonaparte family. The whole of the executive power centres in the hands of the emperor, who employs 10 ministers, placed at the head of the following departments: 1, the state and imperial household; 2, justice; 3, finance; 4, home or the interior; 5, foreign affairs; 6, war; 7, navy; 8, public instruction and worship; 9, agriculture, commerce, and public works; 10, Algeria and the colonies. The last was created June 24, 1858, its duties having been previously performed by the minister of the navy. To these were added from 1851 to 1853 a ministry of police, which has been merged in the home department. The legislative power, which is in fact under the immediate control of the executive, is nominally divided between 3 great bodies politic: 1, the senate, consisting of not over 150 members, appointed for life by the emperor, and of the archbishops, marshals of the empire, and admirals, who are *de facto* entitled to seats; 2, the legislative body, comprising 267 deputies, who are elected for a term of 5 years; 3, the council of state, consisting of 40 councillors, 40 masters of requests, and 40 auditors, all of them appointed and removable at will by the emperor. This council is intrusted with the preparation of the various bills and administrative regulations; the legislative body examines and votes upon such bills as are introduced by the ministers; the senate, the province of which is the preservation of the laws and the constitution, gives its sanction to the measures which have been adopted by the deputies. There are 33 ambassadors or ministers plenipotentiary of France to foreign countries, with an equal number of secretaries of embassy or legation, and 113 consuls, 24 of whom are styled consuls-general. The internal administration of each department is in the hands of a prefect, who is assisted by a council of prefecture, and has under his direction the sub-prefects of the arrondissements; a mayor, aided by a municipal council, is at the head of each commune. Councils of arrondissement and councils of department hold sessions of a few days every year to regulate the assessment of taxes and give expression to the wishes and wants of their respective communities. Such are the administrative arrangements all over the country, with the exception of the department of the Seine and the city of Lyons, which have an organization of their own.—For the administration of justice France has 27 imperial courts established in so many of the principal cities, and holding jurisdiction over from one to 7 departments. They are composed of a president, several vice-presidents, and from 20 to 60 councillors, to whom must be added an attorney or *procureur* general, assisted by advocates general and substitutes. The principal of these courts is that of Paris. Under them, each arrondissement has its court of original or primary jurisdiction (*tribunal civil ou de première instance*); each canton, its tribunal of justice of the peace and its simple police court. At the head of the judiciary establishment stands the court of cassation, which is a superior court of appeal in both civil and criminal cases; its decisions are invested with the highest authority. The crime of high treason falls under the jurisdiction of an exceptional high court of justice. The courts of assize are organized with juries, but take cognizance of criminal cases only. The court of accounts (*cour des comptes*), although not a regular tribunal, may be also mentioned here; it is established to audit and examine all the accounts connected with the public revenue and expenditure. Beside the regular judiciary courts, tribunals of commerce and councils of *prud'hommes*, chiefly composed of commercial men, are established in the principal manufacturing and commercial towns, to decide upon cases connected with trade and manufactures. The penitentiary institutions of France have somewhat improved during the last 20 years, but are still far from being as complete and perfect as they ought to be in a highly civilized community. Beside the *bagnes* of Brest, Rochefort, and Toulon, most of the inmates of which have been lately transported to the penal colonies of Guiana, there are 20 central prisons for convicts of various grades, the principal being at Clairvaux, Gaillon, Melun, Poissy, Mont St. Michel, Clermont, &c. They contain an average of about 17,000 persons. It is estimated that there are annually from 35,000 to 40,000 individuals under confinement or the surveillance of the police.—Reli-

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gious toleration is exercised to its full extent, and the law secures equal freedom and protection to every kind of worship. A vast majority of the population belong to the Roman Catholic church. The French government supports not only the pastors of this church, but also those of the Protestant and Jewish communions. France, including its colonies, is divided into 85 Catholic dioceses, 70 of which are bishoprics, and 15 archbishoprics, viz.: Aix, Albi, Auch, Avignon, Besançon, Bordeaux, Bourges, Cambrai, Lyons, Paris, Rheims, Rouen, Sens, Toulouse, and Tours. Only 5 of the bishoprics are out of France proper, viz.: Algiers, La Réunion, Ajaccio, Martinique, and Guadeloupe. Every bishop and archbishop is assisted by vicars-general and a chapter. The dioceses are divided into parishes, which, according to their importance, are intrusted to priests, holding for life, with assistants, or to mere officiating ministers removable at will by the bishops. There are 175 vicars-general, 661 canons, 3,388 curates with 7,190 vicars, and 29,537 officiating ministers. Each diocese has a seminary for the instruction of clergymen; theological colleges or faculties exist at Paris, Aix, Bordeaux, Lyons, Rouen, and Toulouse. The French Protestants mostly belong to the Lutheran and Reformed or Calvinist churches; they number about 4,000,000. The Lutherans, who live principally in the departments of Haut-Rhin, Bas-Rhin, Doubs, and Seine, have 249 pastors, with presbyterial councils and consistories under the superintendence of a directory at Strasbourg, where their chief theological seminary and a faculty are situated. The Calvinists, who mostly inhabit the departments of Seine, Gard, Charente-Inférieure, Ardèche, Drome, Tarn, Tarn-et-Garonne, Lot-et-Garonne, Lozère, and Deux Sèvres, have 507 church pastors, presbyterial councils, 91 consistories, a central council sitting at Paris, and a theological college at Montauban. The Jews, numbering about 100,000, who are found principally in the large towns of the east and south, have synagogues at Paris, Strasbourg, Colmar, Metz, Nancy, Bordeaux, and Marseilles, with a central council in the capital. Their pastors consist of a great rabbi of the central council, 7 great synagogue rabbis, 53 rabbis, and 61 officiating ministers. The clergy of the Catholic church, which, previous to the French revolution, was the holder of fully one third of the landed property, and had a yearly income amounting to very near $40,000,000, now receive a salary, the aggregate amount of which is scarcely over $5,000,000.

—The government has a direct and supreme control over public instruction, through the instrumentality of that powerful institution known as the university of France, and the combined action of its civil officers in the administration thereof. The minister of public instruction, placed at the head of the whole organization, is assisted by an imperial council and a body of 18 inspectors-general. The country is divided into 16 districts, each with its academy; the seats of these institutions are at Aix, Besançon, Bordeaux, Caen, Clermont, Dijon, Douay, Grenoble, Lyons, Montpellier, Nancy, Paris, Poitiers, Rennes, Strasbourg, and Toulouse. Each academy is governed by a rector, with an academy inspector for every department. The rector is assisted by an academical council, of which he is the presiding officer; the academy inspector, by a departmental council presided over by the prefect. Three grades of instruction are recognized, superior, secondary, and primary. Superior instruction, embracing the highest branches of human knowledge only, is given by a number of faculties, the professorships of which are intrusted to men of tried capacity and talent. There are 8 faculties of theology (6 Catholic, 2 Protestant), 9 of law, 3 of medicine, 16 of science, and 16 of letters. Secondary instruction, nearly equivalent to the curriculum of American universities, is supplied by secondary schools of medicine and pharmacy, imperial lyceums and communal colleges, under-seminaries, chiefly for theological students, private institutions, and schools. On March 1, 1854, there were 61 lyceums, with 21,076 pupils; 253 communal colleges, with 27,905 pupils; and 1,081 private schools and institutions (825 of them under the direction of laymen, 256 conducted by clergymen), with an aggregate number of 63,657 pupils; the under-seminaries not included. The above two branches of public instruction are under the special control of the rectors and academy inspectors. The third, primary instruction, is especially intrusted to the care of the prefects, aided by special inspectors. For primary instruction there are 460 high schools, and 63,000 primary schools established all over the country. These are supported by the communes; part of their pupils are admitted free of expense; the others pay a trifling annual charge. Asylums for children complete the establishments of primary instruction. Normal schools for the education of primary teachers exist in nearly all the departments, and have worked satisfactorily. A superior normal school, established at Paris, is the seminary from which come the majority of the professors appointed in the imperial lyceums: this institution has been of great service, and many of its alumni have gained a scientific or literary reputation. In connection with this, we must mention the French school at Athens, to which a number of young men from the normal school are sent by the government to perfect their knowledge of the Greek language. Candidates for the Catholic priesthood are educated in high ecclesiastical schools or great seminaries under the exclusive control of the Catholic bishops; ministers are prepared in the Protestant seminaries at Strasbourg and Montauban; rabbis in the central rabbinic school at Metz. These schools are of course out of the pale of the university. So are also the celebrated polytechnic school, where naval, military, and civil engineers, artillery officers, &c., are educated; the military schools of St. Cyr, La Flèche, and Saumur; the practical schools

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for artillery and engineering, &c.; all of which are under the supervision of the minister of war. Some other practical schools connected with the navy, civil engineering, the mines, manufactures, forests, &c., are respectively controlled by the ministers to which they more properly belong. The central school of art and manufactures at Paris, a dependency of the ministry of public works, deserves particular notice on account of its general usefulness. Important in a higher sphere are the college of France, where lectures are delivered on the highest topics of science and literature; the museum of natural history, an admirable collection of animal, vegetable, and mineral wealth, connected with the *jardin des plantes;* and the lectures on oriental languages delivered at the imperial library. Above all these learned institutions stand the French academy, the academies of inscriptions, of science, of the fine arts, and of moral and political sciences, which compose the 5 classes of the illustrious institute of France. In 1854, the number of public libraries in the departments amounted to 338, containing 44,070 MSS. and 3,689,869 printed works. This does not include the public libraries of Paris, which are over 37 in number, with 104,000 MSS. and more than 2,500,000 printed volumes. There are in France 1,037 printing offices, publishing 1,115 periodicals. Paris has 91 printing offices and 470 periodicals.—The charitable institutions of France are very numerous. Hospitals and asylums exist in nearly every town of importance. These establishments, some of which hold considerable property, are supported by the state, the department, or the commune. They are 1,338 in number, with an income amounting to over $10,500,000, and yearly accommodate about 50,000 patients. The largest and wealthiest are at Paris, Lyons, Bordeaux, Rouen, Marseilles, Lille, Nantes, and Strasbourg. There are military and marine hospitals under the control of the secretaries of war and the navy. The former, established in the principal fortified places of the empire, are 42 in number, with 18,000 beds for officers, non-commissioned officers, or privates, under the care of officers and men belonging to the medical staff of the army. The 4 marine hospitals at the great seaports of Cherbourg, Brest, Rochefort, and Toulon, can accommodate about 5,000 patients, and are taken care of by sisters of charity and male overseers. Of several asylums for disabled soldiers and sailors who have served their country for a period of years, the most celebrated is the *hôtel des invalides*, at Paris, having a marshal of France for its governor, and a large staff of officers. It contains nearly 3,000 old soldiers, generously provided for by the government. Among the other institutions are the blind asylum, known as the *hospice des quinze-vingt*, and the imperial institution for the education of the blind at Paris; the imperial institutions for deaf and dumb there and at Bordeaux; over 40 lunatic asylums, the most important of which are at Charenton, near Paris; foundling hospitals, &c. Poor-relief boards (*bureaux de bienfaisance*), at least 7,000 in number, give either indoor or outdoor relief to over 700,000 individuals. Various societies for the assistance of prisoners or the sick, and a vast number of philanthropic associations of all kinds, are dispersed throughout the country. There are 46 *monts-de-piété* (pawnbroking establishments), with a capital of nearly $10,000,000, making yearly loans to the amount of about $12,000,000. Such loans are gratuitous in 5 of the above establishments; interest in the others varies from 2 to 15 per cent. The first savings bank (*caisse d'épargne*) was established in 1818 at Paris; and on Jan. 1, 1858, there were 411 in all parts of the country. The interest on deposits is 4 per cent.—A double system of taxation exists in France. The direct taxes are those laid on land (*contribution foncière*), on houses (*contribution des portes et fenêtres*), on persons (*contribution personelle et mobilière*), and on licenses (*impôt des patentes*). The indirect taxes, beside the import and export duties, comprise excise charges upon wines, brandies, salt, gunpowder, tobacco, postage, public stages and coaches, stamped paper, registry of deeds and sales, &c. This complicated system requires an army of public officers and collectors of every rank, private and general receivers, payers, &c. These are under the control of the minister of finance, who is assisted by 54 finance inspectors and the court of accounts. Beside the government taxes, there are numerous local ones, mostly established in the towns of importance to defray local expenditures; they are generally known under the name of *octrois*. The yearly estimate of receipts and expenditures is called the *budget*, which is proposed by the minister of finance and voted upon by the legislative assemblies. We give below a table of the budgets at several periods:

Years.	Receipts, fr.	Expenditures, fr.
1815	743,880,200	798,500,859
1818	1,113,610 375	1,154,649,860
1824	994,971,962	992,583,283
1830	1,011,796,054	1,095,142,115
1831	1,305,556,970	1,214,610,965
1848	1,767,955,620	1,776,980,740
1852	1,448,834,652	1,508,398,815
1857	1,709,874,519	1,698,904,664
1858	1,737,115,171	1,716,989,896
1859	1,773,919,114	1,166,080,877

The receipts and expenditures in detail in 1858 were as follows:

Receipts.	Francs.
Direct taxes	445,396,068
Registration, stamps, and public lands	350,023,396
Forests and fisheries	34,959,500
Customs and salt duty	2 7,874,000
Indirect taxes	424,016,000
Post office	56,570,000
Miscellaneous	205,017,926
Extraordinary sources	1,129,286
Total	1,737,115,171
Expenditures.	
Public debt	522,851,196
Dotations (including the civil list of the emperor, 25,000,000 fr.)	39,470,316
Ministry of state	9,127,600
" of justice	27,961,370
Carried over	598,800,243

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Brought forward	598,800,342
Ministry of foreign affairs	10,256,000
" of the interior	145,748,080
" of finances	19,162,297
" of war	346,729,607
" of the navy and colonies	132,989,117
" of public instruction and worship	65,766,186
" of agriculture, commerce, and public works	80,941,300
Collection and administration of the revenue	187,522,934
Repayments	109,563,063
Extraordinary expenses	19,593,000
Total	1,716,969,396

The principal items of expenditure in the budget for 1859 are: ministry of state and imperial household, 12,729,400 fr.; justice, 28,398,270; foreign affairs, 10,470,600; interior, 150,623,818; finances, 903,694,229 (including 530,473,698 interest on the public debt); war, 354,042,020; navy, 123,985,536; Algeria, 16,563,002; public instruction and worship, 68,040,936; agriculture, commerce, and public works, 98,159,466. The public debt, Jan. 1, 1856 and 1857, stood as follows:

Description.	1856.	1857.
Floating debt:		
Bearing interest	651,764,100 fr.	773,521,900 fr.
Not bearing interest	76,338,200	79,415,200
Consolidated debt	7,553,040,822	8,031,992,466
Total	8,286,143,122 fr.	8,884,929,566 fr.

During the 15 years of the restoration (1815–'30) the national debt was more than trebled; under Louis Philippe (1830–'48) it increased but one fourth; while within the last 10 years it has nearly doubled. From 1851 to 1858 the increase was at the rate of 439,949,200 francs a year, and from 1814 to 1859, a period of 45 years, of which only 3 have been years of war, the public debt of France has been in the aggregate increased from $240,000,000 to $1,700,000,000, and the annual charges thereon to be provided for by taxes from $12,000,000 to $100,000,000.—The military establishment of France is not only formidable in extent, but placed upon such a systematic basis of administration as to secure its full efficiency. The control of the whole belongs to the minister of war, who is assisted by several boards or consultative committees of general officers, severally attending to business connected with the general staff, infantry, cavalry, artillery, fortifications, &c. The army, previous to the war in Italy (1859), consisted of the following troops: infantry—100 regiments of the line, 20 battalions of chasseurs de Vincennes, and 9 companies of veterans; cavalry—2 regiments of carabineers and 10 regiments of cuirassiers, forming the reserve; 12 regiments of dragoons and 8 of lancers, being the cavalry of the line; 12 of chasseurs and 8 of hussars or light cavalry, and 10 supplementary companies; artillery—17 regiments, heavy and light, with 4 companies of veterans and 14 companies of workmen; engineers—3 regiments, 2 companies of workmen, and 1 company of veterans. The above does not include the imperial guard nor the troops especially belonging to the African service. The former, a select body of tried soldiers, comprises: infantry—3 regiments of grenadiers, 4 of voltigeurs, 1 of Zouaves, 1 of chasseurs, 1 of gendarmerie; cavalry—2 regiments of cuirassiers, 1 of dragoons, 1 of chasseurs, 1 of guides, 1 squadron of mounted gendarmerie; artillery—1 mounted regiment, 1 on foot (with 1 squadron of workmen), and 1 division of the corps of engineers. The African troops consist of 3 regiments of Zouaves, 3 battalions of light African infantry, 1 foreign legion of 2 regiments, 3 regiments of Algerian sharpshooters, 12 discipline companies, 3 regiments of mounted African chasseurs, and 3 of mounted Spahis. A body of troops, called the imperial gendarmerie, forms an armed police force, whose functions are to preserve order at home. The aggregate of the above troops in 1858 amounted to 409,062 men, distributed as follows: infantry, 247,641; cavalry, 65,407; artillery, 34,262; others, 61,752. The general staff comprised 10 marshals of France, 78 generals of divisions, 154 brigadier-generals, beside 79 generals of division and 170 brigadier-generals belonging to the reserve. The above figures have been of course altered by the state of war. During the Crimean war, there were in active service 581,000 men and 113,000 horses. The army is recruited by an annual contingent of about 80,000 men, either volunteers or conscripts, above 20 years of age. The conscripts are chosen by ballot for a term of 7 years. There are several causes of exemption, either natural or legal, and any conscript has it in his power, by paying a fixed sum, to put a substitute in his place. France is divided into 21 military divisions, governed by generals of division, and the most important by marshals, and 87 subdivisions under brigadier-generals. The headquarters of the divisions are in the following towns and cities: Paris, Rouen, Lille, Châlons-sur-Marne, Metz, Strasbourg, Besançon, Lyons, Marseilles, Montpellier, Perpignan, Toulouse, Bayonne, Bordeaux, Nantes, Rennes, Bastia, Tours, Bourges, Clermont, and Limoges. The country is protected by 185 fortresses or strongholds, the most important being the following: 1, along the N. frontier, Lille, Douay, Condé, Valenciennes, Maubeuge, Givet, Mézières, Sedan, Longwy, Thionville, Metz, and Haguenau; 2, along the E. frontier, Strasbourg, Befort, Besançon, Fort de Joux, Lyons, Grenoble, Briançon; 3, along the Mediterranean coast, Antibes, Toulon, Marseilles, Cette, Fort St. Elme, Port Vendres; 4, along the Pyrénées, Bellegarde, Mont Louis, Perpignan, Bayonne; 5, along the western and northern coast, the islands of Oléron, Ré, Noirmoutiers, Belle-Isle and Groix, Rochefort, La Rochelle, Lorient, Brest, St. Malo, Mont St. Michel, Cherbourg, Havre, Boulogne, Calais, and Dunkirk. The government has 3 cannon founderies, at Douay, Strasbourg, and Toulouse; and factories of gunpowder, muskets, cannon balls, &c. Its military arsenals and warehouses can place at any moment at the disposal of the army about 12,000 guns and howitzers of various sizes, with immense stores of munitions of war of every kind.

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The French war department is admirably complete in all its appointments. The principal military schools have been previously alluded to.—The French navy is perhaps the branch of public service that has increased and improved the most since the establishment of the empire. The vessels afloat in 1848 were as follows: 21 ships of the line, 32 frigates, 37 war corvettes, 47 brigs, 90 sailing vessels of smaller size, and 76 steam vessels; in all, 291 vessels afloat, beside 23 steam and 48 sailing vessels; total, 362 vessels. In March, 1855, the total had been increased to 420, distributed as follows: 56 ships of the line, 80 frigates, 58 corvettes, 37 brigs, 6 sailing gun brigs, 33 light sailing vessels, 26 transport ships, 73 steam advice boats, 20 steam gun boats, 5 sailing bomb vessels, 5 floating batteries, 8 sailing gun boats, 13 sail and steam transports. Of these, 212 were sailing vessels, of which 181 were afloat and 31 building; and 208 steam vessels, 157 afloat and 51 building. In 1858 there were afloat or building 252 sailing vessels with 8,106 guns, and 209 steam vessels with 4,414 guns, making a total of 461 vessels, carrying 12,520 guns and 56,616 seamen and marines. The total number of seamen exceeds 62,000; there are beside 4 regiments of marines, 14,761 strong, and 3 regiments of artillery, 3,514 strong. The naval staff, previous to the war, consisted of 2 admirals, 13 vice-admirals, 23 rear-admirals, 114 ship captains, 341 frigate captains, 678 lieutenants, 552 sub-lieutenants or midshipmen (*enseignes*), and 230 cadets (*aspirants*). There are boards of marine engineers, of hydrographical engineers, of inspectors, &c. Naval schools, and several schools of application, for the education or scientific improvement of the officers and even the seamen, are connected with the navy department. A board of admiralty, another superintending the naval works, and a third attending to the improvement of instruction among the sailors, act as advisors to the secretary of the navy. The maritime territory of France is divided into 5 districts or prefectures, subdivided into arrondissements and quarters. The naval prefects reside at Cherbourg, Brest, Lorient, Rochefort, and Toulon, and under them officers, called heads of service, commissaries, and under commissaries, are placed in the several subdivisions. —France could once boast of the extent of her colonial possessions in America, and also for a while in Asia. She has lost the greater part of them, and possesses now only the following: 1, in Africa, Algeria on the N. coast, several islands, seaports, and military posts on the banks of the river Senegal, the island of Goree on the coast of Senegambia, S. of Cape Verd, and some trading posts along the coast of Guinea, and La Réunion, formerly Bourbon island, S. E. of that continent, in the Indian ocean; 2, in Asia, the districts of Pondicherry, Karical, Chandernagore, Yanaon, and Mahé in Hindostan; 3, near the coast of North America, the islands of St. Pierre and Miquelon; 4, in the Caribbean sea, Martinique, Guadeloupe, Marie-Galante, Les Saintes, Desirade, and one half of St. Martin island; 5, in South America, Guiana; and 6, in the Pacific ocean, the Marquesas islands, or Mendana archipelago, and New Caledonia. Tahiti and Gambier islands are under the protectorate of France. The population of Algeria is estimated (1856) at about 2,600,000, natives and Europeans; the latter do not exceed 160,000, of whom, according to the last census, 107,407 are French. The population of the other colonies scarcely reaches 600,000, a little over $\frac{1}{3}$ of whom are Europeans.—France, which comprises the largest part of the country formerly known as Gallia Transalpina, owes its name to the Franks, one of those associations of German tribes that invaded and dismembered the Roman empire during the 5th century. These warriors were above all noted for their fiery spirit and rashness. Crossing the lower Rhine, they settled in the northern part of Belgium under various chiefs, and successful conquest brought them gradually to the banks of the Somme. Meanwhile other hordes of barbarians had taken possession of several other provinces of Gaul; the Burgundians had peacefully shared the eastern part of this country with the Gallo-Romans, while the Visigoths, already masters of nearly the whole of the Spanish peninsula, extended their military rule over the population of Aquitania. The cities of Armorica had formed themselves into a confederation, and the central part of Gaul from the Somme to the Loire was alone held by the Romans. Such was the condition of the country in 481, when a young man of 15 was proclaimed king by the Frankish tribe living in and around the city of Tournay. This was Khlodwig or Clovis, the founder of the Frankish dominion in Gaul, and of the Merovingian dynasty, as it was called from his grandfather Meroveus. In 486 he invaded the Roman province, conquered the governor, Syagrius, at Soissons, and thus secured to himself the possession of the whole country to the Loire. Ten years later, after forcing back to Germany some rival tribes which had crossed the Rhine in the hope of dividing the spoils with the Franks, Clovis, yielding to his wife's entreaties, consented to be baptized, and henceforth all the Catholic bishops of Gaul were enlisted in his cause. Their powerful influence helped him greatly in consolidating his authority among the Gallic population, and carrying his conquests southward. A single victory won (507) at Vouillé over the Visigoths, who were Arians, gave him the possession of nearly all Aquitania. On his death in 511, his kingdom extended from the banks of the Rhine to the Pyrénées, thus including the whole of Gaul, with the exception of the province occupied by the Burgundians, the Mediterranean shore, which had been retained by the Visigoths through the aid of Theodoric, king of the Ostrogoths, and the peninsula of Brittany. This kingdom, although partitioned among the 4 sons of Clovis, was soon increased by the conquest of Burgun-

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dy; and Khlother or Clotaire I., the youngest of those princes, surviving his brothers and nephews, could for a while (558–561) boast of possessing a larger empire than his sire. A new division among his own sons brought on long civil wars between the eastern Franks or Austrasians, who inhabited from the Rhine to the Meuse, and the western Franks or Neustrians, who lived W. of the latter river. The Burgundians, who under their new masters had preserved their name, sided alternately with the one or the other; while the Aquitanians, taking no interest in a conflict among their barbarian conquerors, were little affected by it. This bloody period, which extends over the latter part of the 6th century and the beginning of the 7th (567–613), presents two leading characters: Brunehaut or Brunehilde, the queen of Siegbert of Austrasia, and Fredegonda, the queen of Chilperic of Neustria. The latter, a true representative of the barbarity of her age, was notorious only for her crimes; her brother-in-law, her stepson, her own husband, fell in succession under the daggers of her emissaries. She died a natural death in 597. Brunehaut, on the contrary, a Gothic princess of refined education, of more than ordinary power of mind, dragged by misfortune and passion into a series of bold enterprises, always preserving a queenly dignity in the most desperate circumstances, died in dreadful tortures at the hands of her rival's son. Her death ended for the time the national struggle; and Clotaire II. held the whole of the Frankish dominion under his sceptre. So did his son Dagobert (628–638), who had a taste for magnificence, and took as his principal minister Eligius or Eloi, the most celebrated silversmith of his time, who was canonized as a saint. His successors were mere phantoms of royalty, and have been styled "lazy kings" (*rois fainéants*). A kind of prestige being still attached to the Merovingian name, they preserved the royal title, while the power was wielded by the mayors of the palace, who, from the condition of private officers of the king's household, had, by help of the aristocracy, risen to the rank of prime ministers, in each of the three kingdoms, Austrasia, Neustria, and Burgundy, of which the Frankish dominion consisted. Through their rivalry the old contest between the Austrasians and the Neustrians revived; notwithstanding the political talents displayed by Ebroin, mayor to the sons of Clovis II. (660–681), the Neustrians were at length controlled by the mayors of Austrasia, who soon took the title of dukes, and finally acquired absolute possession of the Frankish kingdoms. Pepin of Héristal, the most illustrious among these nominal ministers and real monarchs, governed them in the name of several successive kings. After his death (714), his natural son Karl, so celebrated under the name of Charles Martel, seized and wielded with an iron hand a still more extensive power. The victory won by him over the Saracenic invaders of France (732), between Tours and Poitiers, secured for him an unparalleled historical celebrity, and paved the way to the throne for his successor. Twenty years later, 752, his son Pepin, confining the last of the Merovingians, Childeric III., within the walls of a convent, with the approval of the pope, assumed the title of king. The first two princes of the Carlovingian dynasty, both great men, raised the Frankish power to its highest pitch. Pepin the Short (752–768), firmly establishing his authority all over Gaul, forced into complete submission Aquitania, which during the reign of the lazy kings had succeeded in vindicating its independence, and conquered Septimania, a province along the Mediterranean shore, which had been held by the Arabs of Spain. He made his influence also felt in Italy, where the Lombards became his tributaries, while his liberality toward the pope brought to his side the powerful moral agency of religion. His son, Karl or Charlemagne, following the same policy, showed himself the most faithful protector of the holy see, overthrew the Lombard monarchy, and placed the iron crown upon his own head in 774; waged for 32 years (772–804) a merciless war against the Saxons, who were finally subdued and compelled to embrace Christianity; destroyed the last remnants of the barbarous Avars who had settled in Hungary, and tried his arms against the Moslems of Spain. He thus made himself the master of an empire which included not only Gaul, but the whole of Germany, the largest part of Italy, and the N. E. of Spain. To invest his dominion with a more imposing character, he styled it the "new empire of the West," and was crowned by the pope at Rome in 800. He aimed indeed at a complete restoration of the ancient Roman empire, by marrying the Byzantine empress Irene; but this was prevented by revolutions at Constantinople. Amid his wars and vast political designs, Charlemagne found leisure to extend the blessings of civilization to his subjects, by establishing schools and patronizing science and literature. The new emperor impressed all the world with respect for his greatness and genius; and such was his fame abroad that embassies came to his court from the most distant sovereigns. His son, Louis le Débonnaire (814–840), a weak and superstitious prince, was peculiarly unfitted for the heavy task which devolved upon him, and the selfish ambition of Louis's successors hastened the national and social disruption. Less than 30 years after Charlemagne's death (843), his empire was divided into 3 kingdoms, and 35 years later (888), through the imbecility of his great-grandson, Charles the Fat, it had entirely fallen to pieces. From its fragments were formed the kingdoms of France, Italy, and Germany, with the secondary states of Lorraine, Burgundy, and Navarre. Amid the convulsions which led to this consummation, the power of the nobles had been rapidly increasing; the dukes and counts, who had been at first mere officers of the kings, had contrived to make their dignities hereditary; and Charles the Bald

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(877) not only sanctioned their pretensions, but extended the principle of inheritance to all the fiefs. Such was the foundation of the feudal system, the origin of which may be said to coincide with the beginning of France proper. The name France indeed appears in history about the 9th century, and applies to the country W. of the Scheldt, the Meuse, the Saône, and the Cévennes; and henceforth we distinctly see a French nation forming by the fusion of the Frankish with the Gallo-Roman element, and a new language, a mixture of the German and the Latin, springs up at the same time. The Carlovingian family, being essentially Germanic, could scarcely preserve the affections of this new people; the imbecility of most of its later members moreover brought them into contempt. They were soon opposed by national princes who had courage and talent; and after a struggle which went on during the latter part of the 9th and nearly the whole of the 10th century, they were finally deprived of their hereditary throne, and another dynasty was inaugurated (987). Previous to this a new race, the Normans, had established themselves in the N. W. of France. They had carried on a system of piracy along the coast as early as the reign of Charlemagne, and since then they had pushed their incursions into the very heart of the country; most of the principal cities were laid waste; and the terror-stricken people, unable to resist such formidable assailants, bribed them to depart. But such a measure only insured their return; and at last the imbecile Charles the Simple thought the best way to stop the invasions was to give the invaders possession of part of the country; the beautiful lands situated W. of the lower Seine were ceded in 912 to Rollo, the chief of a large horde of these Northmen, and Normandy soon became one of the most flourishing and best regulated provinces in France. Its dukes held the first rank among the feudal princes, when Hugues or Hugh Capet, the duke of France, on the death of Louis V., assumed the title of king (987). The beginning of the new dynasty to which this prince gave his name was humble. Hugh was indeed in point of territory the most powerful of the feudal lords; but he had the prestige of neither past glory nor genius. His immediate successors were even less distinguished than himself; they took no part in the great events by which the 11th century was marked. While southern Italy was conquered by Norman adventurers, while William of Normandy was giving a new rule to England, while all the Christian princes eagerly engaged in the crusades, the Capetians quietly stayed at home; and by this very inactivity, without any particular display of policy, they upheld their royal supremacy, which during the 12th and 13th centuries was established on a solid foundation by kings of uncommon ability. Louis VI. (1108–1137), a king of unsurpassed activity and bravery, forced a great many of the nobles into submission, and to this end more than once availed himself of the support he found among either the clergy or the people of cities. The latter, whose material and moral condition had greatly improved during the previous century, were then vindicating their municipal liberties, and willingly entered into an alliance with the king against their feudal masters. Philip Augustus (1180–1223), the most sagacious prince of his time, nearly doubled the royal domains. Beside Normandy, Touraine, Anjou, Maine, and a large part of Poitou, which he seized upon by force, after confiscation had been adjudged by parliament against King John of England, he acquired by various means the counties of Artois, Vermandois, Valois, Auvergne, &c., making his royal power felt at the same time from the Pyrénées to the Rhine, and from the Mediterranean to the English channel. Vainly did the count of Flanders ally himself with the English king and Otho IV. of Germany. Philip gained over his combined enemies a brilliant victory at Bovines in 1214; and thenceforth the royal power was paramount over the country. France was thus enabled to play a conspicuous part in European affairs; and the rank to which Philip's able policy raised her was fully maintained by the wisdom of his grandson, Louis IX. (1226–1270), who proved himself at once a saint and a hero. The traditional policy was followed under his reign; well devised treaties and fortunate marriages were concluded, which secured the ultimate possession of Languedoc and Provence, while the commons, or the third estate, as it was then called, was placed under the more immediate control of the king. The introduction of the Roman law and the regular constitution of the parliament, forming a high court of justice which was to supersede gradually all feudal jurisdictions, were mighty additions to the efficiency of the royal power; while the king's personal kindness and virtue, the wisdom of his administration, the removal of many grievances under which the people complained, and the severity with which oppressions by the nobles were punished, conciliated the respect and affection of the nation. The popularity thus secured for the royal title was so strong as to be scarcely impaired by the unworthiness of Louis's successors, who completed the monarchical system that was to prevail for several centuries. More than ever they leaned upon the third estate in order to counterbalance the ascendency of the two privileged orders. Men of low birth had already been introduced into the parliament; under Philip IV. their influence increased, and representatives of the third estate were admitted to the general assemblies of the nation, which before had consisted only of deputies from the clergy and the nobility. Through these new members the king was nearly certain to gain his end in all important circumstances. It was by their agency that he succeeded in 1302 in triumphing over the pretensions of Pope Boniface VIII. Neither were they inactive when this same king induced Pope Clement V. to suppress the knights templars, seized upon their immense wealth,

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and brought their grand master to the scaffold. The Capetian kings, whatever may have been their faults and personal shortcomings, succeeded in giving so powerful an organization to the kingdom as to enable it to stand the brunt of the foreign and civil wars which were to threaten its existence under the younger branch of Valois (1328–1589). The rivalry between France and England, consequent upon the accession of Duke William of Normandy to the throne of the latter, had already been the cause of occasional hostilities between the two nations; it came to a decisive crisis during the first half of the 14th century. On the direct branch of the Capetians becoming extinct, Edward III., by virtue of hereditary right derived from his mother's side, claimed not only such provinces on the continent as had been taken from his ancestors, but the whole kingdom of France; thus beginning that protracted conflict which French historians call the "hundred years' war" (1337–1453). Twice France was on the eve of becoming a dependency of the English crown. In 1340 an English fleet destroyed the naval force of France at Sluis, on the coast of Flanders; in 1346, at Crécy, the English archers won an unexpected victory over the flower of French chivalry; and 10 years later, at Poitiers, the Black Prince not only conquered King John, but made him prisoner. The states-general were also the scene of a deadly struggle between the regent and the third estate, so that royalty itself was put in jeopardy; companies of adventurers and mercenary troops ransacked the provinces; the peasantry of several districts, driven to despair by the oppression of their lords, broke out into a fearful insurrection, which was named the *Jacquerie*, and marked by all the horrors of a servile war. Charles V., by his vigorous policy, succeeded in quelling internal disorders; and with the help of his great constable, Du Guesclin, he regained in a few campaigns all the English acquisitions in France, with the exception of a few important seaports. When both died, in 1380, the kingdom was in a fair way to regain its former prosperity. But the minority of Charles VI., and his subsequent derangement, again plunged France into a series of calamities. The conflict between the various classes of society was renewed with increased fury; rival factions, headed by princes of the royal family, Orleans and Burgundy, waged against each other a war of treason and assassination; while the English, encouraged by the forlorn condition of their enemy, again invaded France. For the 3d time, the French chivalry was decimated on the memorable field of Agincourt (1415). John the Fearless being treacherously murdered by the Orleanists or Armagnacs, in an interview which was intended to bring about peace, Burgundy, that is, the N. E. part of France, threw itself into the arms of the English. An insane king, a queen of foreign origin impelled by her unnatural hatred to her son the dauphin, and a prince carried away by his thirst for vengeance, concluded the famous treaty of Troyes, 1420, by which the royal inheritance of France was delivered up to her deadly enemy. Henry V., on marrying the princess Catharine, was appointed heir to Charles VI., and meanwhile was to assume the power of regent. France seemed now to be irretrievably lost; all her organized powers, royalty, clergy, nobility, and burgesses, were prostrated, when a simple country girl appeared and overthrew the power of England. Carried away by patriotic, or, as was supposed, by a supernatural inspiration, Joan of Arc was the very impersonation of the national feeling; the English were defeated, and the disinherited son of Charles VI. was triumphantly conducted to Rheims to receive there the royal unction (1429). Brought to a premature end by treason and cruelty, the Maid of Orleans could not complete the deliverance of her country, but she had given the signal; the nation, aroused by her example, fought its own battles, and after 20 years of repeated efforts, drove the foreign invaders away (1453). Calais, the only place now left in the hands of the English, was to be retaken 105 years later. After these long trials, France was at last enabled to exercise her recuperative powers; her population increased at a rapid rate, industry and art flourished, and the last vestiges of the past calamities disappeared. Meanwhile her kings had returned to their traditional policy of enlarging the royal domains and consolidating the royal power by the destruction of the feudal aristocracy. To this task none applied himself with greater zeal than the crafty and tyrannical Louis XI. (1461–1483). Numberless nobles of every rank were delivered to the executioner; the most powerful of all, Charles the Bold, duke of Burgundy, was led to his ruin and death in 1477 by the intrigues of Louis, who at once seized upon part of the large inheritance left by that formidable vassal, and the duchy of Burgundy was thus annexed to the crown. The fine provinces of Anjou, Maine, and Provence, beside claims upon the kingdom of Naples, were bequeathed to Louis by the last prince of the house of Anjou; the king of Aragon resigned to him the counties of Roussillon and Cerdagne; and France, reaching thus her natural frontiers toward the S. and the S.E., became one of the great powers on the Mediterranean. On the N. W., by the marriage of Charles VIII. with Anne of Brittany, she gained possession of that large province, which had hitherto been nearly independent. With a well organized army and a full treasury, she was now ready for foreign contests. Under Charles VIII., a weak-minded prince who dreamed of following in the footsteps of Alexander the Great and Charlemagne, a French force invaded Italy in 1494, and conquered the kingdom of Naples without opposition; but this conquest was lost still quicker than it had been gained. Such was the commencement of those Italian wars in which the imprudence of the French shone no less conspicuously than their prowess, and in which the brightest victories were always followed by irretrievable disasters. Italy was justly termed the grave of

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the French. Louis XII. tried all the arts of diplomacy to secure his conquests, but he was no match for the Italian politicians of the 16th century, and still less for the crafty Ferdinand of Aragon. By the latter he was expelled for ever from Naples, of which he had partly taken possession, while Pope Julius II., the republic of Venice, and the princes of Italy, availing themselves of Spanish, German, and even English alliances, forced him ont of the duchy of Milan, which he claimed in right of his grandmother, Valentina Visconti, and which he had twice conquered. Francis I., in his turn, appeared in Italy as a conqueror, and his first victory at Marignano or Melegnano (1515) seemed to forebode permanent conquest; but the king of France was opposed by the emperor Charles V., and after his disastrous defeat at Pavia in 1525, he was carried a prisoner to Madrid. Not daunted by the captivity of the king, France kept up the contest against the immense forces which Germany, the Netherlands, Spain, and Italy placed at the disposal of their imperial master. Francis I., after his liberation, and his son Henry II., were conscious of the importance for their own country, as well as for Europe, of checking the ascendency which the house of Austria aimed at; for more than 30 years France waged war not only for her own independence, but for that of Europe also; more than once her own borders were invaded; but she finally came out of the struggle with honor, and not without profit. She was indeed obliged to give up all her claims to possessions in Italy; but, by the treaty of Cateau Cambrésis (1559), she added to her provinces the bishoprics of Metz, Toul, and Verdun, which she had just conquered; while by her alliance with the Protestants of Germany on the one side, and with the Turks on the other, she succeeded in defeating the ambitious designs of the Austrian monarchs. During this period, her social organization had been improved; science and literature had been cultivated under the fostering care of the king, the princes, and the wealthy; poets and prose writers had appeared who had given comparative perfection to the French language; painting, sculpture, and architecture had been successfully cultivated; and with all its drawbacks, the first half of the 16th century may be accounted one of the brightest periods in her history. The latter part of this century unfortunately was darkened by the horrors of religious civil wars. The reformation had been hailed with joy by many minds in France, and its doctrines were rapidly propagated by Calvin and his followers. Mostly circulated at first among the nobility, they gained ground all over the country, although it may be remarked that the great mass of the nation remained faithful in their allegiance to the Roman Catholic church. Francis I. and Henry II. attempted to check the progress of the new principles; they even resorted to persecution, but this only gave a new impetus to the religious movement. Their numbers increasing daily, the Protestants planned a powerful organization not only to preserve their liberty of conscience, but also to gain, if possible, political influence. They formed, as it were, a kind of commonwealth within the state. This could not but inspire the rulers of an absolute government with uneasiness and fear; and although prudent advisers tried at first to bring about a reconciliation, such a policy could not be permanently adopted, and the king was soon found entirely on the side of the Catholics. Both parties meanwhile had their chosen chiefs, and both were ready for the contest. This commenced in fact as early as 1560, during the short reign of Francis II., and lasted with more or less violence till 1598. No fewer than 8 civil wars were waged during the reigns of Charles IX. and Henry III., a period of scarcely 28 years. The Protestants held their ground with tenacity; the most illustrious among their chiefs, Admiral Gaspard de Coligni, accomplished wonders; but, thoroughly honest and too ready to confide in the honesty of others, he permitted himself to be deceived by the fair promises of Charles IX., and with thousands of his companions was treacherously murdered on St. Bartholomew's night, 1572. This fearful massacre did not however annihilate the Protestants, who continued the struggle against the holy league or Catholic union, which had been organized for the better protection of the Catholic church in France, and which was upheld by the pope as well as Philip II. of Spain. The head of the league, Duke Henry of Guise, secretly aimed at the crown, and his popularity seemed to warrant his success, when Henry III. during the session of the states-general at Blois, in 1588, had him despatched by his body guards, known as the "forty-five." A few months later, in 1589, the king himself fell by the dagger of the fanatic Jacques Clément, leaving his crown to Henry of Navarre, the head of the family of Bourbon, and the leader of the Protestants. The struggle henceforth took essentially a political turn; and Henry, joined by but a few of the Catholics who had served his predecessor, and much reduced in circumstances, had great difficulty in making good his claims to the crown. His personal bravery and ability, and the sympathetic gayety of his character, finally conciliated many of the Catholic royalists, but he could hope to be recognized as king by the majority of the nation only on his conversion to Catholicism. To this he assented, June 25, 1593; and now his whole attention was given to the pacification of his kingdom. This he effected by concluding with Spain the treaty of Vervins, May 2, 1598, upon the conditions of the old treaty of Cateau Cambrésis, and by publishing the celebrated edict of Nantes, which granted to the Protestants full religious liberty, admission to all offices, and several places of security, among others the strong city of La Rochelle. Henry now devoted himself entirely to the work of healing the wounds which had been inflicted on the country during nearly 40 years

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of bloodshed and devastation. Assisted by Sully, his bosom friend and minister, he restored order in all branches of public service, ameliorated the administration of justice, lightened the taxes while bettering the public finances, fostered agriculture, encouraged the arts and sciences, and finally created a regular system of government, aiming especially at the moral and material improvement of the people. He then returned to the old policy of Francis I., and meditated the humiliation of the house of Austria; great preparations were made for the enterprise, and Henry was on the eve of his departure for the army, when he was assassinated by Ravaillac, May 14, 1610. This calamity interrupted for nearly 15 years the progress of the kingdom at home and abroad. Under the regency of Henry's widow, Mary de' Medici, mother of Louis XIII., disorders were renewed; the Protestants dreamed of their imaginary independent commonwealth; the public treasure was scandalously wasted; and the kingdom was distracted by war between the queen mother and the young king, soon after the latter reached his majority. Happily a great minister, Cardinal Richelieu, took the reins of government in 1624, crushed rebellion under whatever form it showed itself, consolidated the power of the monarch at home, and partly reviving the political designs of the late king, boldly threw the influence and arms of France into that European conflict called the 30 years' war. While annihilating the political power of the French Protestants, he energetically supported the German Protestants in their struggle against the house of Austria; to this end he spared neither money nor troops; and on his death, in 1642, the rival of France had been already many times humbled. The successor of Richelieu, Cardinal Mazarin, pursued the same policy; and the first years of the reign of Louis XIV. were marked by brilliant victories, most of them won by the young duke d'Enghien, afterward the "great Condé." The treaty of Westphalia in 1648 not only asserted the triumph of religious and political liberty in Germany, but the victory of France over Austria, a victory which added to her territory the province of Alsace. The troubles of the Fronde, a faint image of the old civil wars, detracted nothing from the influence gained abroad by the French government, and Mazarin concluded with Spain, in 1659, the treaty of the Pyrénées, which secured two other provinces to France, Artois and Roussillon. This able politician resigned to the hands of Louis XIV. a kingdom well prepared for the full exercise of absolute power. Under this monarch France rose to the height of fortune and glory, while he himself was placed above all control. Louis XIV. was firmly impressed with the belief that God sends kings on earth as his chosen representatives, and imparts to them especial lights for the fulfilment of their mission. This consciousness of almost preternatural superiority, being united in him with unlimited ambition, untiring perseverance, a domineering spirit, and firm self-reliance, invested him with many of the attributes of greatness. From the day of Mazarin's death he assumed the whole direction of public affairs, and his ministers were little more than clerks, intrusted with the execution of his designs. Two only, Colbert and Louvois, can be regarded as exceptions to the rule; but pliant courtiers as they were, their pretensions never disturbed the king's self-confidence, and the plans and improvements they suggested were of course appropriated by the king as his own. The first years of his administration were the most useful. Colbert devoted himself to improving all the resources of the kingdom; every branch of revenue became prosperous; and, as at the beginning of the century under Henry IV., the national wealth increased with unusual rapidity. Intellectual progress kept pace with material, and every thing conspired to create a literary period of unparalleled magnificence. A short war against Spain, which was terminated by the treaty of Aix la Chapelle in 1668, scarcely interrupted this happy commencement; but it had awakened suspicions among the neighboring powers, and a triple alliance was formed between Holland, Spain, and England. Scarcely 4 years had elapsed when Louis XIV., at the head of more than 100,000 men, invaded Holland, which, being deserted by one of her allies, could be preserved only by the united exertions of Spain and Germany; the bloody contest lasted 6 years; the French armies, under Condé, Turenne, and Luxembourg, were victorious in nearly every encounter, while French fleets distinguished themselves against the united naval forces of Spain and Holland. The peace of Nimeguen, 1678, put an end to regular hostilities, but not to the encroachments of Louis XIV., who, inflated by success, seized upon provinces and cities which, according to his own construction of past treaties, belonged to France. Europe, tired of war and awed by the events of the last campaigns, durst not thwart the course of the overbearing monarch. Louis had now reached the zenith of his greatness; he had added to his kingdom Flanders, Franche Comté, the imperial city of Strasbourg, and several other important territories; he was feared abroad and respected at home; he was Louis the Great for his subjects, and even his enemies scarcely refused him this title. The league of Augsburg, devised by William of Orange, had united together the emperor, Holland, Sweden, and Savoy, and was joined by England on the revolution of 1688. Louis XIV., who undertook to reëstablish James II. on his throne, engaged in a desperate struggle against that powerful coalition, and maintained it for 9 years; his armies and naval forces, the former especially, still achieved many triumphs; and when the peace of Ryswick was concluded in 1697, the allies, although they boasted of success, were nearly as much exhausted as their opponent. This 3d war of Louis XIV. may in some degree be considered a war of principle; the 4th and last one, that of the Spanish succes-

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sion, was brought about by mere family ambition. A more formidable coalition opposed the ambitious schemes of the old king, who aimed at nothing less than placing his grandson upon the Spanish throne, vacant by the death of Charles II.; the two greatest generals of their time, Marlborough and Prince Eugene, were at the head of the allied armies; defeat after defeat befell the French forces, and the kingdom seemed reduced to extremities; but the constancy of the king did not fail him during a contest of 12 years' duration; he succeeded in his bold undertaking, and by the treaties of Utrecht and Rastadt (1713–'14) the house of Bourbon inherited the best part of the once magnificent Castilian monarchy. The burden which he bore to his last moments was far too heavy for his weak successors; he had moreover taxed the energies of France and stretched the royal power to such an extent that a reaction was unavoidable. The 18th century was an age of depression, decay, and ruin for all the institutions, doctrines, and classes that had hitherto commanded respect. Royalty lost its prestige, both through the unbounded licentiousness of the regent duke of Orleans, and the king himself, and through the irretrievable corruption or imbecility of its ministers; nobility became degraded; the great constituted bodies fell into general contempt; and an uncontrollable spirit of censure and raillery hastened the work of destruction. Even the remedies that were tried only added to the universal confusion. Politically the French government, controlled in turns by unscrupulous princes, by Cardinal Fleury, who, how good soever his internal administration, failed to support the national dignity abroad, and by the king's mistresses, gradually sank in the eyes of Europe; and toward the end of Louis XV.'s reign, it could scarcely be ranked among the great European powers. The 4 wars in which France then participated, against Spain (1717–'19), for the succession of Poland (1733–'35), for the succession of Austria (1740–'48), and finally the 7 years' war (1756–'63), were productive only of disgrace and disaster. This dark picture is somewhat relieved by occasional successes and individual deeds of gallantry; such was especially the case in the 3d war above mentioned, when Maurice of Saxony won glorious victories for the country of his adoption, and vindicated her claim to be still one of the great military powers of Europe; but the 7 years' war placed in a shameful light the incompetence of the French generals, the unparalleled want of discipline among their soldiers, and, notwithstanding a few happy exceptions, the lowering of the general military character of the nation. The navy was not only demoralized; but it was utterly ruined; the French colonies in Asia and America were lost, and the French flag almost disappeared from the seas. At home, however, literature and philosophy were cultivated with extraordinary ardor, and with the glory of these pursuits the nation seemed aiming to cover the disgrace which had befallen her arms. One consequence of the spread of philosophical teachings was an earnest and general desire for reform, which showed itself in different ways as soon as Louis XVI. had ascended the throne (1774). The king himself and some of his counsellors were willing to place themselves at the head of this reform movement; but the well-meaning monarch was too deficient in energy, and the opposition around him was too strong, to admit of the success of such an undertaking. The privileged orders carried their hostility so far, that the people took the reforms into their own hands; and a revolution was the result. This very revolution was partly prepared by the help which Louis XVI. extended to the English colonies in America; the sympathy which nearly all classes felt for their liberty, the principles which their example diffused among the thoughtful, the enthusiasm excited by their ultimate triumph, encouraged the French nation to attempt its own liberty. The states-general met on May 5, 1789; the third estate, by dint of prudence, energy, and perseverance, secured its ascendency over the nobility and the clergy, and swore not to separate until they had given a constitution to their country, and thus originated a movement that soon became uncontrollable, but which, though it occasioned many grievances and sufferings, was finally productive of much good. The constituent assembly, the first of the great assemblies which guided the French revolution, labored for about 2½ years, from May 5, 1789, to Sept. 30, 1791, to establish the principles which still form the basis of the French law and constitution—civil and religious liberty, equality of rights, and popular sovereignty. It overthrew feudal and hierarchical privileges, provincial divisions and customs, gave to the country a regular administration, and tried to establish a kind of constitutional monarchy. The legislative assembly, which succeeded, had but a short existence, from Oct. 1, 1791, to Sept. 21, 1792; ill satisfied with the new form of government, it did not uphold it, and paved the way for the republican government. This was at once proclaimed by the third popular assembly, the national convention, on its first meeting, Sept. 21; and then the fearful trials, butcheries, and gigantic struggles of the French revolution commenced. Organizing at once a government of absolute powers, the convention sentenced Louis XVI. to death as a declaration of war against all the kings of Europe, and summoned all nations to independence, extending to them the helping hand of France. Thenceforth the country had to struggle against nearly all the European powers; the tremendous impulse it gave to the whole people carried her through all foreign dangers; and when the convention adjourned, Oct. 26, 1795, after a session of more than 37 months, the republic was everywhere triumphant. The internal struggles between the republican and the reactionary parties

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that marked the existence of the directorial government, from Oct. 27, 1795, to Nov. 9, 1799, are merged in the military glory of Bonaparte, whose campaigns in Italy (1796–'7) and expedition to Egypt (1798–'9) pointed him out as the future master of the nation. When, on his return from the East, the young general drove the legislative council from their chamber and formed a new constitution, his course was unanimously approved, and the history of France became for 15 years the history of a single man. Chosen first consul for 10 years, Dec. 13, 1799, he broke up the coalition which had been formed against France, by his victory at Marengo, June 14, 1800; forced Austria to conclude the peace of Luneville in 1801, and England that of Amiens in 1802; and by a concordat with the pope reëstablished Christian worship in France. Consul for life, Aug. 3, 1802, then hereditary emperor, May 18, 1804, he proved himself a great legislator at home by the formation of the civil code, the organization of public instruction, and the improvements he introduced in all the branches of public service; while he added to his military and political glory by his triumphs at Austerlitz, Jena, Auerstadt, Eylau, Friedland, Eckmühl, and Wagram, and by the treaties of peace which he signed at Presburg, 1805, Tilsit, 1807, and Vienna, 1809, with the great powers of Europe, successively brought by England into coalition against him. He had now reached the height of his power and glory; he had placed his brothers on the thrones of Holland, Westphalia, and Spain, and his brother-in-law on that of Naples; he thus extended his influence over nearly the whole of western Europe, and played a part equal, if not superior, to that of Charlemagne. But his insatiate ambition was an incessant cause of terror and hatred against him among the sovereigns and the nations of Europe; they were waiting for the moment when this wonderful fortune should begin to decline. It was shaken by the successful resistance which the conqueror met with in the Spanish peninsula (1808–'13); but his prestige was ruined by his disastrous expedition to Russia in 1812. The European nations, recovering their courage, united against him; and their combined exertions inflicted upon him at Leipsic, Oct. 18, 1813, a blow from which he never recovered. It was in vain that he accomplished wonders during the campaign of 1814; he could not expel his enemies from the French territory; he was dethroned, and a prince of the house of Bourbon received from the conquerors the sceptre of France, now restricted to her old limits. The sudden return of Napoleon from Elba overthrew this new power; and for 100 days, from March 20 to June 28, 1815, he was again the acknowledged sovereign of France; but the battle of Waterloo (June 18, 1815) destroyed his power forever, and the Bourbons, under the protection of foreign bayonets, once more ruled the kingdom. Louis XVIII., the first monarch under the restoration, granted a charter to his subjects, and keeping carefully within the limits of that instrument, died in undisturbed possession of his throne, although, in compliance with orders from the holy alliance, he had in 1823 sent a French army to put down the liberal revolution in Spain. His brother, Charles X., a strange mixture of generous impulses and conceited bigotry, anxious to take back the little liberty France was enjoying, tried to divert public attention by supporting the Greek insurrection against Turkey (1827–'8) and conquering Algiers (1830). But these enterprises failed to conciliate public opinion; and when the king attempted to suspend some of the most important guarantees secured by the charter, a formidable insurrection broke out, July 27, 1830. Charles was obliged to abdicate; and after a few days' interval, his cousin, Louis Philippe, duke of Orleans, was appointed king (Aug. 9) by the chamber of deputies. The choice, however, being acceptable to the middle classes or *bourgeoisie*, was maintained; and notwithstanding some occasional outbursts of republicanism among the people, the July monarchy, as it was called, lasted for 18 years. At first Louis Philippe seemed willing to fulfil the expectations of the liberalists, supported Belgium against Holland, and seized upon Ancona to counterbalance the influence of the Austrians in Italy. But by degrees his policy was changed; the government proved reactionary at home and devoid of energy abroad; and the popular favor on which it had relied deserted it. A political manifestation in favor of parliamentary reform brought on another revolution, Feb. 24, 1848; and although the majority of the nation would have preferred the continuation of a constitutional liberal monarchy, the irresistible course of events precipitated them into a republic. The middle classes, being apparently resigned to their present fate, professed to be ready to give this new form of government a fair trial; but within a few months their representatives in the constituent assembly, frightened by socialistic movements, gave strong evidence of their deadly opposition to it. A so-called republican constitution was adopted, and on Dec. 10, 1848, Louis Napoleon Bonaparte, the nephew of Napoleon I., was elected president of the French republic for a term of 4 years, by 5,658,755 votes, against about 1,500,000 given to Gen. Cavaignac, who had done good service for the preservation of order during the most trying circumstances. Internal dissensions, some signs of which were apparent, soon estranged the majority of the legislative assembly from the president; and rumors of revolution became rife as the epoch of a new presidential election approached. The expected revolution took place, Dec. 2, 1851; by a bold stroke of policy the president dissolved the assembly, assumed dictatorial powers, and made an appeal to the people, asking them to sanction by their votes what had been done. The support of the army had been previously secured, and various unconcerted attempts at armed resistance were smothered by energetic and bloody measures. The

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revolutionary president, who alone controlled the elections, was chosen for a term of 10 years by 7,839,216 votes; a new constitution, very much like the consular one framed by Bonaparte in 1799, was promulgated; and finally, Nov. 7, 1852, the senate made a motion for the reëstablishment of the empire; this having been assented to by a vote of 7,824,129 citizens, the empire was proclaimed, Dec. 2, 1852. The emperor wields his power with such energy and ability that he is considered the leading spirit of Europe; and France has resumed the rank she held during the reigns of Louis XIV. and Napoleon I. The war against Russia for the protection of the Ottoman empire (1854–'5), and that in Italy against Austria (1859), show that she has lost nothing of her military superiority.—A more detailed account of the principal events in the history of France will be found in the articles on her various sovereigns, statesmen, and generals.—See *Statistique générale méthodique et complète de la France*, by J. H. Schnitzler (4 vols. 8vo., 1842–'6); *Patria, ou la France ancienne et moderne* (2 vols., Paris, 1847); *Rerum Gallicarum et Francicarum Scriptores, ou recueil des historiens de France*, by Dom Bouquet and other Benedictine monks, continued by members of the institute (21 vols. fol., 1738–1857); *Collections des mémoires relatifs à l'histoire de France*, respectively published by Guizot, Petitot, Buchon, and Michaud and Poujoulat; the general histories of France by Sismondi (31 vols. 8vo., 1821–'43), Henri Martin (4th ed., 17 vols. 8vo., 1855–'9), Michelet (not yet complete, 12 vols. 8vo., to Louis XIV.), Théophile Lavallée (12th ed., 4 vols. 12mo., 1858), and Duruy (2 vols. 12mo., last ed., 1859); "History of France," by E. E. Crowe (5 vols. 8vo., London, 1858 *et seq.*); "History of France," by J. White (1 vol. 8vo., Edinburgh and London, 1859).

FRANCE, Isle of. See Mauritius.

FRANCE, Language and Literature of. The French is the most important of the 6 Romanic languages produced from Latin by the influence of other tongues. The Italian, the Rumanic or Wallachian, the Provençal, Spanish, and Portuguese are its sisters. The Belgæ of Gaul probably spoke Celto-Teutonic, the Aquitani Celto-Iberic, while the Celtæ or Galli proper occupied the centre of the country, and at the same time Greek colonies held points on the Mediterranean sea. The language of Rome overwhelmed all these idioms. The Gallic, however, was yet spoken in the 3d century; Celticism was perceptible in the *lingua rustica*, or degenerate Latin, at the close of the 5th century; and the ancient vernaculars continued to exist afterward. The *rustica* extended from the Rhine to the Pyrénées in the 4th century. The corruption of the Latin was similar in all the countries from the Danube to the mouth of the Tagus, and the above-mentioned languages differ only in consequence of the various barbarous tongues that have acted upon them. Since the Suevi, Visigoths, Burgundians, Franks, &c., made no efforts to destroy the languages of the inhabitants of Gaul, comparatively few words of theirs survived in the *lingua rustica*. Many Celtic elements had combined with the Latin even before Cæsar, and some were introduced afterward; but it is difficult to distinguish them from the Latin stock on account of their common origin from the storehouse of the Indo-European family of languages. The Latin jargon, tainted by Germanic ingredients, is called *lingua Romana*, and also *Gallica* or *Gallicana*. It coexisted for some time with the *Frenkiska* (*Francisca*, *Francica*), or *Theotisca* or *Tudesque*; and although it continued to exist with more vigor than the last named, it was eventually called *lingua Franco-Gallica*, or rather *Franco-Romana*, *langue Françoise*. While the Frankish prevailed in the N. and E. of the country, the *rustica* or *Romana* was spoken S. of the Loire, although also used in the Frankish regions. The council of Tours (813) recommended the use of both the rustic and Tudesc versions of the homilies. Probably the most ancient monument of the Roman is the oath of Louis the German to Charles the Bald, who on his part swore in German, in Strasbourg, Feb. 842. This oath ran as follows:

Pro Deo amur et pro Christian poblo et nostre
Pour l'amour de Dieu et pour le peuple Chrétien et notre
commun salvament, dist di en avant, in
salut commun, dorénavant (de isto die in ab-ante), en
quant Deus savir et podir me dunat, &c.
tant que Dieu savoir et pouvoir me donnera, &c.

The Latin grammatical suffixes were gradually dropped, and the accusative case was in general taken as the new word. Auxiliary verbs were successively introduced from the Teutonic idioms, the case endings were supplied by prepositions, the personal endings of verbs by pronouns, or both by the fragments of ancient endings and by pronouns before the verb. In the 10th century the Latin *ille*, *iste* were converted into the article *le* and the pronouns *il* and *cet* (*ce*), the latter being pronounced *st*. According to Raynouard's hypothesis, the *lingua Romana* was separated into two dialects. The Visigoths and Burgundians S. of the Loire said *oc* (Latin *ac*, German *auch*, also) for *yea*, for which the Franks and Normans (who established themselves in France in 912) along the Seine used *oil*; hence the southern or Provençal dialect was named *la langue d'oc*, and the northern (Roman-Wallonic) *la langue d'oil*. After 879 the focus of the former was at the court of the kings of Arles, and in 927 the chief point of the latter at the court of the duke of Normandy. Less troubled by wars and more thoroughly Romanized, the south produced distinguished *troubadours* during two centuries, while the north had, somewhat later, its *trouvères*, both named from *trovare*, to find —finders of songs, poets. From the beginning of the crusades to the death of St. Louis (1095–1270) both dialects approached toward a fusion. The vulgar language was employed in the crusades in rousing the populace, whose war-cry was: *Diex el volt* (God wills it). Under John the

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dlets were held both in *oc* and in *oil*. A few fragments of the Bible date before 1100; but popular heroic and religious songs appear to have been composed and recited by the *jongleurs (joculatores)*. The development of chivalric poetry in Provence was checked by the persecution of the Albigenses; the language of the troubadours was proscribed, and, together with the political rule of the north, the idiom of Picardy (a branch of the *langue d'oil*) extended toward the south. The real French language began to be developed about the time of the conquest of Constantinople by the French crusaders, at the beginning of the 13th century. Already before the conquest of England by William (1066) English youths were sent to be educated in France; but the conquest made the Norman-French the official and court language in England. Froissart's "Chronicles" (14th century) is the first work in genuine French. Francis I. substituted the language for Latin in public transactions. Rabelais greatly enriched it; Ronsard and Du Bellay, Amyot and Montaigne, and others developed it further. The religious reform, political troubles, the influence of the Italian wars and queens, modified it greatly. The introduction of Arabic words is chiefly due to the crusades, and that of Greek and Latin words and of scientific terms to the study of those languages and to the cultivation of the natural sciences. The *académie Française*, established by Richelieu for the regulation of the national language (1635), the influence of the court, the labors of the Port-Royalists, especially Pascal (1656), and a galaxy of great writers, purified, augmented, and diffused it more and more. It was first used as a diplomatic language at the conferences of Nimeguen (1678).—The French is certainly a very clear tongue, on account of the strictly logical order of its syntax, but very monotonous, and incapable of the composition of words already fixed, as well as of bold poetic turns. The French language, in short, is, like every other, the exponent of the nationality, vicissitudes, intelligence, culture, and taste of the people that speak it. The following are some examples of the changes from ancient to modern French forms: A—*aimer, père, chanté, mer, table, chien*, &c., from *amare, pater, cantatum, mare, tabula, canis;* E—*espoir, plein, venin, fiel*, &c., from *sperare, plenus, venenum, fel;* I—*foi, ordonner, cercle, vaincre, sangle, vierge*, &c., from *fides, ordinare, circulus, vincere, cingulum, virgo;* O—*heure, cœur, voue, puis*, &c., from *hora, cor, rota, post;* U—*puit, joug, nombre, fleuve, croix*, &c., from *puteus, jugum, numerus, fluvius, crux;* Æ—*Égypte, Grec, siècle, proie, Juif*, &c., from *Ægyptus, Græcus, sæculum, præda, Judæus;* Œ—*ciel, fecond, foin, morne*, &c., from *cœlum, fœcundus, fœnum, mœrens;* Au—*or, louer, oiseau, aboyer, peu*, from *aurum, laudare, avicella, adbaubare* (barbarous), *paucus*. Tonic vowels were dropped or suffered various changes of elision or contraction, even destroying the organic affinity of the consonants; *e. g.: l'ami, s'en aller*, for *le ami, se en aller; mûr, sûr, plonger, rage, Dijon, orge, roche, sèche, pigeon*, &c., from *maturus, securus*, barb. *plumbeare, rabies, Divio, hordeum, rupes, sepia, pipio*. By transposition, the improper diphthongs, the *l* and *gn mouillés*, are often produced; thus: *muid, chaîne, Seine, empereur, merveille, paille, ognon*, &c., from *modius, catena, Sequana, imperator, miraculum, palea, unio*. Examples of change of consonants are: C—*gobelet, glas, groupe, figue, chant, Charles, musique, queue, voisin, fait, verrue*, &c., from *cupella, classicum, corpus, ficus, cantus, Karl, musica, cauda, vicinus, factum, verruca;* Q—*égal, chercher, Seine*, &c., from *æqualis*, barb. *quæricare, Sequana;* G—*jaune, Anjou, je, frêle, loyal, lire, géant, Geoffroi*, &c., from barb. *galbinus, Andegavi, ego, fragilis, legalis, legere, gigantem, Gottfried;* H—*Louis*, from Hludovic (Chlodwig), &c.; the letter I became hissing, as *joug, jeu*, &c., from (the original) *iugum, iocus;* P—*chèvre, chanvre, ravir, double, chef, écrit*, &c., from *capra, cannabis, rapere, duplex, caput, scriptum;* B—*devoir, siffler, dette*, &c., from *debere, sibilare, debitum;* F—*hâbler, hêtre (haître), Arnoul, Raoul*, &c., from *fabulari*, barb. *fagaster, Arnolf, Radulf;* Ph—*faisan, fantaisie, fanal*, &c., from Greek words written with Φ; V—*brebis, courber, œuf, guêpe*, &c., from *vervex (vervecem), curvare, ovum, vespa;* T—*salade, cascade, père, saluer, veau, puis, perche*, &c., from Ital. *salata* and *cascata*, Lat. *pater, salutare, vitulus, post, pertica;* D—*jour, jusque, bai, voir, hui, avocat, bénir, pié, nu*, &c., from *diurnus*, barb. *de-usque, badius, videre, hodie, advocatus, benedicere, pes (pedem), nudus;* S—*été, échelle, épée, émail, crête, naître, tête, mât, hâte*, &c., from both *æstate* and Ital. participle *stato* (Span. *estado*), *scala*, Germ. *Spaten, Schmelz*, Lat. *crista, nasci, testa*, Germ. *Mast, Hast;* also *nez, rez, chez*, &c., from *nasus, rasus, casa;* and *s* instead of Latin *tis: vous louez, prenez, assez*, &c., from *laudatis, prehenditis*, barb. *ad-satis;* X—*tâcher, mâchoire, mèche, moustache, tisser*, from *tazare, maxilla, μύξα, μυσταξ, texere;* L—*rossignol, apôtre, épître, pérugue, orme, remorque*, &c., from *lusciniola, apostolus, epistola*, barb. *piluca, ulmus, remulcum;* *niveau, amydon (amidon), aube, baume, bougre, autre, chaud, chauz, Guillaume, mou, beauz, cheveu*, &c., from *libella* (level), *αμύλον, alba, balsamum, Bulgarus, alter, calidus, calz, Gildhelm, mollis, bellus, capillus;* R—*autel, pèlerin, auberge*, &c., from *altare, peregrinus*, Germ. *Herberge;* M—*nous aimons, Garonne, conter, nappe, nèfle, airain, rien, on, mon, houblon* (whence Eng. *hop*), &c., from *amamus, Garumna, computare, mappa, mespilus, æramen, rem, hominem, meum, humulus;* N—*licorne, orphelin, Bologne, jour, four, Béarn, île, épouse, mois, couvent, coûter*, &c., from *unicornis, ορφανος, Bononia, diurnus, furnus, Beneharnum, insula, sponsa, mensis, conventus, constare;* Gn—*mouillé* in *Champagne, vigne, Espagne, grogner*, &c., from *Campania, vinea, Hispania, grunnire*.—Examples of adventitious letters are: *e*

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before an initial impure *s*, as in *escabeau, escarmouche, estomac, esquif, esprit*, &c., from *scabellum*, Teuton. *skirmish, skiff*, στομαχος, *spiritus*. Other prefixed letters are: *grenouille, huître, lendit, nombril, tante*, &c., from *ranicula, ostrea, indictum, umbilicus, amita*. In the following examples letters have been inserted for the sake of euphony: *chambre, dompter, Embrun, trompette* (*trombe*), *hante, rendre, Angoulême, jongleur, trésor, perdrix*, &c., from *camera*, barb. *domitare, Eburodunum, tuba, hasta, reddere, Iculisma, joculator, θησαυρος, perdix*.—Changes of quantity and of accent, and all sorts of mistakes in writing and in pronunciation, have further increased the dissimilarity of words from their prototypes, which were chaste, strong, organic, and significant. Some further examples may show both the deviation from the prototypes and the conglomeration of altered words into ungainly compounds. Of the first kind are: *oindre, teindre, coucher, chômer, coutume, poltron, gêne*, &c., from *ungere, tingere, collocare*, Romanic *calmare, consuetudinem, pollice-truncato*, biblical *gehenna*. Specimens of altered words are: *alentour* (*à le en tour*), *auparavant* (*à le par ab ante*), *aujourd'hui* (*à le jour de ho-die*), *désormais* (*de is(ta) hora magis*), *dorénavant* (*de hora in ab ante*), *lorsque* (*la hora qua*), &c. Owing to the mixture of the languages of *oc* and *oil*, as well as to the introduction of many forms in later times, there are, as it were, two parallel idioms in the French language; as for instance: *eau, ciel, père, chef, temps, bois, poudre, verre, poumon, doigt, pierre, faux, mauvais*, &c., alongside of *aquatique, céleste, paternel, capital, temporel, ligneux, pulvériser, vitreux, pulmonaire, digitale, pétréfaction, falsifier, malveillant*. As the accent or stress falls upon the last effective syllable of a word, imparting thus a monotony to the spoken language, some pretend that the French has no accent. This is an incorrect assertion, for *possible, inconsolable, sentiment*, &c., differ from the English words in accent more than in sound. There is also no reason for the denomination of the 3 signs (´`^) as accents, since they are marks of omission, and the two first sometimes marks of sound; thus, for instance, in *été, être, père, sûre, maître*, &c., derived from *æstate* and *estado* (see above), *estre* (Span. *estar, stare*), *patre, securus, magister*, they denote omissions; and in words like *pénétrer, célébrer, célèbre*, &c., the ´ and ` are merely signs of sound, as no word can have more than one accent.—The French is written with the same letters as the English. K and W occur only in Norman and Flemish names incorporated into French, and in other foreign words. There are 12 distinct vowels as regards their quantity; they are represented by 6 letters called vowels, or by their combination, and by the help of *m, n*, viz.: *a, â, é, i, o, u, ou, eu*, and 4 nasals, *an, in, on, un*. Including all modifications (*á, é, í, ó, ú, oú*, and the so-called *e muet*), they stand for 20 sounds, of which Malvin-Cazal and Michelet of the *conservatoire de musique* count 17. Of consonants there are 20, represented by 18 letters, viz.: *b, k* (also written *c* and *ch* as in *chœur*), *q, qu*, and *g* as in *sang et eau*), *d, f* (and *ph*), *g* hard (also *gh, gu*), the sound of English *s* and *z* in *vision, erosier* (written *g* before *e, i*, and *y*, and *j* before all vowels except *i* and *y*), *h* (unless mute), *l, l mouillé* as in the English *million* (written *ill, il, gli, lh*), *m, n, n mouillé* as in the English *onion* (written *gn, nh*), *p, r, s* (also *c* before *e, i, y*; also *x* in *Bruxelles*, *t* in *nation*), *t* (also final *d* when pronounced with the next word, as *grand homme*), *v* (also final *f*, when pronounced with the next word, as *neuf aunes*), *y* as in the English *yes*, with the preceding power of *i* (for instance, *payer*, pronounced *pè-yé*), *z* (written also *s, x*, when pronounced with the next word, as *les eaux, aux esprits*), and the sound of the English *sh*, as in *shall* (written *ch*). Most consonants are not uttered when final, unless they are joined to a succeeding word which begins with a vowel or *h* mute. *S, x, z, t*, being the principal grammatic letters, are most frequently joined in this manner. On French pronunciation Malvin-Cazal and Mme. Sophie Dupuis may be advantageously consulted.—The dialects and *patois* of the French language are: I. The academic, consecrated by the best literature. II. Old French: 1, Walloon (*rouchi*), in Belgium and West Luxembourg; 2, Franco-Flemish; 3, Picard and dialect of Artois. All these are Franco-Romanic. III. New French: A, in the north—1, Norman; 2, *patois* of Paris and Champagne; 3, of Lorraine and the Vosges; 4, the Bourguignon; 5, *patois* of Orleans and Blois; 6, of Anjou and Maine; B, in the middle and west—1, Auvergnat; 2, Poitevin; 3, Vendéen; 4, Bas Breton; 5, Berrichon; 6, Bordelais and Gascon; C, in the east—1, Franc-Comtois and its varieties in Valais and Neufchâtel, and partly in the cantons of Freyburg and Bern; 2, Vaudois (Roman, Romain); 3, Savoisien and Genevois; 4, Lyonnais; 5, *patois* of the cities of Dauphiné; D, in the islands of Jersey and Guernsey, Anglo-Norman. French is also spoken with various local peculiarities or corruptions in Algeria, on the Senegal, in the Mascarene and Seychelles islands, French Guiana, the French West Indies, the greater part of Hayti, in Illinois, Michigan, Louisiana, and some other of the United States, by the *habitans* of Lower Canada and even some aboriginal tribes, and in some settlements in Asia and Oceanica. There are also small French colonies in the Banat of Temesvár and elsewhere. It is the most generally known of all languages among civilized nations, and many illustrious foreigners, as Leibnitz, Humboldt, Gibbon, and Sir William Jones, have written some of their works in it. The dialects of the *langue d'oc*, particularly the Limousin, Languedocien, and Provençal, are spoken S. of a line passing through the departments of Charente, Charente-Inférieure, Haute-Vienne, Creuze, Allier, Puy-de-Dôme, Haute-Loire, Ardèche, Drome, and Isère. Celtic (*Breyzad*) is spoken by nearly 1,000,000 people in Finistère, Côte-du-Nord, and Morbi-

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han; Basque by about 130,000 in Basses-Pyrénées; German by about 1,000,000 in Haut-Rhin and Bas-Rhin, and to some extent in Moselle and Meurthe; Flemish in parts of Nord and Pas-de-Calais; Catalan in Pyrénées-Orientales; and Italian in Corsica.—Among the authors of grammars of the French tongue are: J. Sylvius (1537); Étienne Dolet, *De la ponctuation Française* (Lyons, 1541); Jacques Pelletier, *Dialogues sur l'orthographe et la prononciation Française* (Poitiers, 1550); Loys Meygret, *Tretté de la grammaire*, &c. (1550); Robert and Henry Stephens (Paris, 1558 and '79); Ramus, *Grammaire Française* (1571); Philippe Garnier, *Præcepta Gallici Sermonis* (Strasbourg, 1607); Vaugelas, *Remarques sur la langue Française* (1647); the Port-Royal writers, Lancelot and Arnauld, *Grammaire générale et raisonnée* (1660, often republished); Dumarsais, *Véritables principes de la grammaire Française* (1729); Restaut, *Principes généraux et raisonnés de la grammaire Française* (1730); Wailly, *Grammaire Française* (1754); Condillac, in his *Cours d'études* (1755); Beauzée, *Grammaire générale* (Paris, 1767); D'Olivet, *Essais de grammaire* (1783); Domergue, *Grammaire Française simplifiée* (1778); Levizac, "Theoretical and Practical Grammar of the French Tongue" (1801); Fabre, *Syntaxe Française* (1803); Guéroult, *Grammaire Française* (1806); Lhomond, *Éléments de la grammaire Française*; Girault-Duvivier, *Grammaire des grammaires* (1811, many times reprinted); Landais, *Grammaire générale et raisonnée*, a compilation from numerous sources (1836); Noël and Chapsal, *Nouvelle grammaire Française* (1823, 37th ed. in 1844).—Among the best dictionaries are those by Robert Stephens (French and Latin, 1532); Aimar de Rançonnet (1606); Richelet (Geneva, 1680); Furetière (1690); Menage (1694); the famous dictionary of Trévoux, so named from its place of publication (1704); that of Boiste and Bastien (1800); Roquefort (1829); Raymond; Landais; Charles Nodier, *Dictionnaire critique des dictionnaires* (1808), *Dictionnaire raisonné des difficultés de la langue Française* (1818), *Dictionnaire des onomatopées* (1828); Laveaux (1820); Bescherelle, *Dictionnaire national, ou grand dictionnaire critique de la langue Française* (2 vols., 1843–'6); Noël and Carpentier, *Philologie Française* (1831). The *Dictionnaire de l'académie Française* was published in 2 vols. fol. in 1694, and has been several times reprinted. A *Dictionnaire historique de la langue Française*, on a grand scale, is in preparation by the academy. Girard (1718), Beauzée (1769), Roubaud (1785), and Guizot (1809–'22) have written on French synonymes, and J. B. F. Gerusez (1801), Henry (1811), Villemain, in the dictionary of the academy, J. J. Ampère (1841), F. Wey (1845), and F. Génin (1845–'6), on the history of the French language.—The earliest literature of France is that of the *trouvères* and *troubadours*. The latter, who wrote in the soft southern *langue d'oc*, produced short lyrical effusions on love or matters of trifling import; they flourished most during the 11th and 12th centuries. The *trouvères*, on the other hand, in their narrative poems, known as *chansons de geste*, and written in the energetic *langue d'oil*, treated of great national subjects and celebrated the heroic deeds of illustrious kings and knights. Some of their compositions, the earliest especially, have a striking character of grandeur which may sometimes be not unfavorably compared with that of the ancient epic poems. These *chansons de geste*, which are also called *romances*, are very numerous, and have been classified into 3 cycles, bearing respectively the names of Charlemagne, King Arthur, and Alexander. The first cycle of course includes all such poems as celebrate the deeds of the great Frankish emperor, his descendants and vassals; one of the oldest and perhaps the most magnificent of this category is entitled *La chanson de Roland ou de Roncevaux*. The Armorican cycle or that of King Arthur is filled up with the traditionary legends connected with old Britain and the achievements of the Norman warriors; the *Roman de Brut*, or that of King Arthur of Britain on one side, and the *Roman de Rou*, or that of the dukes of Normandy on the other, may be said to be the double foundation on which all the poems belonging to this series rest. The cycle of Alexander consists of poems in which recollections of Greece and Rome are strangely enough mixed up with chivalric notions and legends of fairy land. The "History of the Taking of Troy," composed about 1160 by Benoît de St. Maure, and the "Romance of Alexander," about 1180, by Lambert li Cors and Alexandre of Paris, are fair specimens of these compositions. They were succeeded by satirical and allegorical poems of equally vast proportions, some of which enjoyed unparalleled popularity, such as the *Roman du renard* and the *Roman de la rose*. The *fabliaux* and several lighter kinds of poetry cultivated by the troubadours were also treated by the trouvères, who found here an appropriate field for their ingenuity and ready wit. Among those who excelled in the *fabliaux* was Rutebeuf, who lived in the reign of St. Louis. Songs were not neglected, and those of the illustrious Abelard in the 12th century enjoyed a wide popularity. Audefroy le Bastard, Quesnes of Bethune, and the castellan of Coucy were among his most distinguished successors. Thibaud, count of Champagne and king of Navarre, deserves to be particularly mentioned; the songs in which he alludes to his love for Queen Blanche of Castile, the mother of King Louis IX. of France, have given him historical celebrity. The progress of prose was slower than that of poetry, but the 13th century presents two specimens showing that it had already acquired a certain degree of power and polish; these are the "Chronicle of the Conquest of Constantinople," by Villehardouin (1207), remarkable for its soldier-like simplicity and straight-forwardness, and the *Mémoires* in which Joinville, with winning artlessness, tells us of the heroic deeds and private virtues of the good king Louis IX. The

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whole literature of the 14th century culminates in Froissart's "Chronicles," which remain the model of this kind of writing, and present the liveliest pictures of society and manners during that period of war and gallant emprise. Christine de Pisan and Alain Chartier deserve notice for their intelligent efforts toward the improvement of prose. This improvement is fully illustrated in the 15th century by the *Mémoires* of Comines, which presents a striking delineation of the characters of Louis XI. and his contemporaries. Already a popular poet, Villon, a strange compound of villainy and inspiration, had given evidence in his poems that French verse was able to reach a high sphere of excellence; and a princely songster, Duke Charles of Orleans, that it had lost nothing of its gracefulness. The revival of antique learning and the religious reformation exercised a powerful influence on French literature in the 16th century. Its principal characteristics being freedom of thought and variety of style, writers cannot be judged according to a single standard. In originality Rabelais and Montaigne are entitled to the first rank. The former, whom Lord Bacon styled "the great jester of France," was a profound scholar, physician, and philosopher, and contented himself with the renown of a profane humorist. His nondescript romance, the "History of Gargantua and Pantagruel," is filled with strange tales, wild notions, amusing quibbles, and gross buffooneries, interspersed with a seasoning of good sense, sound philosophy, and keen raillery. A more refined class of readers are attracted by Montaigne, whose "Essays," one of the standards of French literature, are a series of free and familiar disquisitions upon every subject, couched in the most easy and winning style, but sceptical throughout. His views were partly reduced to a system by his friend and disciple, Charron, in his treatises *De la sagesse* and *Des trois vérités*. Meanwhile the reformation had been vindicated by Calvin in his *Institution de la religion Chrétienne*, a masterly piece of writing, which afforded convincing evidence that French prose had now acquired strength and gravity enough to become a fit vehicle of religious eloquence; and, later in the century, an admirable pamphlet, the *Satire Ménippée*, and some speeches of Chancellor L'Hôpital, proved it to be flexible enough for political purposes. Its capacity for lighter subjects had been previously demonstrated by the tales of Margaret of Navarre. Amyot invested it with new graces by happily blending Grecian and French beauties in his translation of Plutarch's "Lives." In poetry this period was less successful. Clément Marot had indeed exhibited elegance, grace, and wit, in his epistles, epigrams, and elegies; but he had merely given perfection to inferior branches of poetry. Ronsard attempted a higher flight; he tried to invest French verse with that power, variety, and inspiration which he so much admired in Greek metres; but his violent introduction of foreign forms and elements into the vernacular was far from attaining the fortunate results he anticipated; in spite of all his defects, however, he contributed to elevate the tone of French poetry. In the 17th century, Malherbe appeared as the reformer, or rather the regulator, of poetry; a man of fastidious taste and meagre imagination, he ridiculed the artistic luxuriance of Ronsard, and introduced in its stead a style of grammatical correctness and dry elegance which sometimes reached pomposity, but was destructive of feeling and enthusiasm. His polishing process was nevertheless of great service to poetical language; and his odes, stanzas, and other pieces present many beautiful lines, which are frequently quoted. Balzac devoted his attention to the improvement of prose; and his semi-philosophical works, his epistles especially, were valuable at the time as models of careful and harmonious rhetoric. Such were also, notwithstanding their mannerism, the frivolous but witty letters of his friend Voiture. Both were great favorites at the hotel Rambouillet, the headquarters of a society of wits and fashionable ladies, who acted as arbiters of good taste and elegance; many social reunions were now in reality literary clubs, which gave particular attention to philological propriety; one of these, receiving from Cardinal Richelieu the title of the French academy, was especially appointed "to establish certain rules for the French language, and make it not only elegant, but capable of treating all matters of art and science." Leaving mere disquisitions about words to such societies and to second-rate writers, three great men now enriched French literature with works in which style was only a medium for conveying original conceptions or powerful thoughts. Pierre Corneille brought tragedy to a degree of grandeur which has not been surpassed; *Le Cid*, *Horace*, *Cinna*, and *Polyeucte* are still the objects of admiration; while *Pompée*, *Rodogune*, *Héraclius*, *Don Sanche*, and *Nicomède*, though less perfect, abound with striking beauties. Descartes, in his *Discours sur la méthode*, showed that the French vernacular was now equal to the highest philosophical subjects; and Pascal, in his *Lettres provinciales*, in which comic pleasantry and vehement eloquence are happily blended, first formed a standard of French prose. Such was the opening of the splendid literary epoch which is generally styled the age of Louis XIV; and following it came a galaxy of superior minds, who, under the royal patronage, applied themselves to perfecting every branch of literature. Sacred eloquence was perhaps the most successfully cultivated, and the pulpit was adorned by the funeral orations of Bossuet, full of pathos and religious melancholy; those of Fléchier, so remarkable for artistic finish; the sermons of Bourdaloue, the powerful dialectician, and those of Massillon, the most exquisite and most attractive of preachers. Tragedy, in the hands of Racine, lost perhaps a little of the imposing character with which it had been invested by

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Corneille, but teemed with the most touching of human feelings, clothed in a language unapproachable for correctness, elegance, and sweetness. *Andromaque*, *Iphigénie*, and *Phèdre* remind us of the productions of ancient Greece, while *Athalie* brings on the stage in a style of adequate splendor an episode of the Jewish annals. Comedy, which had been successfully attempted by Corneille in *Le menteur*, reached its highest pitch with Molière, a most original delineator of human character; his masterpieces, *Le misanthrope*, *Tartufe*, *L'avare*, and *Les femmes savantes*, are profound and humorous creations. *L'école des maris* and *L'école des femmes*, which are scarcely inferior, *Amphytrion*, a licentious but exceedingly attractive comedy, *Le festin de Pierre*, a strange mixture of the comic and dramatic elements, several farces, *Le bourgeois gentilhomme* and *Le malade imaginaire*, afford abundant evidence of Molière's flexibility of genius no less than of his power of observation. After him, but at a great distance in point of merit, Regnard, Dancourt, and Dufresny furnished the French stage with light comic sketches. Fable, through La Fontaine's genius, was but comedy on a smaller scale; this inimitable poet, whose popularity is unrivalled as it is unfailing, had presented in his collection of fables "a drama in a hundred acts," animated by truthfulness and keenness of observation, transparency of narrative, depth of emotion, and humorous fancy. Most of these qualities are also found in his miscellaneous poems, and especially in his "Tales," whose licentiousness, however, renders them unfit for general reading. Didactic, philosophical, and satirical poetry, that is, poetry under its less poetical forms, had as their representative Boileau, who finished the work previously undertaken by Malherbe, and was indeed the Aristarchus of his time; his *Art poëtique*, his *Épîtres*, his *Satires*, as well as his heroico-comic poem *Le lutrin*, are remarkable for good sense and symmetry; they abound with wise maxims and common truths finely expressed, but are entirely deficient in poetical enthusiasm. Moral philosophy was not neglected; Malebranche, the disciple of Descartes, the sagacious and imaginative author of *La recherche de la vérité*, Bossuet in his *Connaissance de Dieu et de soi-même*, Fénélon in his treatise *De l'existence de Dieu*, and Pascal in fragments which have been collected under the title of *Pensées*, considered the highest problems of humanity from a Christian point of view; while La Rochefoucauld in his *Sentences et maximes* wrote a libel upon mankind, and La Bruyère in his *Caractères* drew vivid and amusing sketches of human characters, manners, and oddities.—History, which under the pens of St. Réal and Vertot was but a faint imitation of the style of ancient historians, was treated with some energy by Mézeray in his *Histoire de France*, and with ingenuity by Fleury in his *Histoire de l'église*, a treasure of good faith and learning; while Bossuet clothed it with an imposing character of eloquence in his *Discours sur l'histoire universelle*, and with all the passionate vivacity of theological discussion in his *Histoire des variations des églises protestantes*. The personal *Mémoires* of Cardinal de Retz concerning the wars of the Frondé are among the masterpieces of familiar history. Hamilton's *Mémoires du comte de Grammont*, a gem of sprightly narrative, brings us to lighter kinds of literature. The novels of Mme. de Lafayette, *Zaïde* and *La princesse de Clèves*, present a faithful though somewhat ideal picture of elegant society, into which we penetrate through the familiar letters written by Mme. de Sévigné to her daughter and friends; in fact these letters, which never were intended for publication, furnish us with a complete and lively panorama of the age. Fénélon's *Télémaque*, which is written in an epic form, and can scarcely be ranked among novels, created a deep sensation toward the end of the 17th century, being considered an indirect censure of Louis XIV., gained great popularity on the same account during the following reign, and deservedly keeps a high rank among French standard works; it marks the crowning point of a period of pure literary glory.—We now reach the age that has been called philosophical *par excellence*. A number of free thinkers, among whom Bayle, the author of the great *Dictionnaire historique*, is the leading spirit, and some licentious poets, Chaulieu especially, had been paving the way for the coming philosophers. The 17th century had been on the whole a religious age; the 18th was eminently an age of scepticism and infidelity. Literature, which had been a pure art, seeking for ideal beauty and religious truths, now became a means of conveying bold opinions or assaulting time-honored creeds and institutions. The whole age was swayed by four men of genius, Montesquieu, Voltaire, J. J. Rousseau, and Buffon, who all exercised a powerful influence over their contemporaries, while each acted a different part in the general struggle. Montesquieu, a writer of unusual scope of mind, combining a masculine vigor with great brilliancy of style, commenced his career by publishing *Les lettres Persanes*, a satire on French manners, government, and even religion. He illustrated the philosophy of history in his *Considérations sur la grandeur et la décadence des Romains*, a masterpiece of historical style, and finally produced the *Esprit des lois*, a profound disquisition upon general legislation—"a book," says Vinet, "with which genius was inspired by justice and humanity." Voltaire, the true personification of his age, protean in disposition as well as in talents, was destined by his faults no less than his good qualities to become at once a leader; and the power he seized when still young, he preserved unimpaired to his last moment. He was for half a century the king of public opinion. His wonderful versatility enabled him to treat successfully almost all branches of literature; as a tragic poet he takes rank by the side of Corneille and Racine; his tragedies, *Mérope*, *Zaïre*, *Mahomet*, *Alzire*,

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&c., combine pathos with dramatic interest and liveliness of style; his *Discours sur l'homme* and other philosophical poems are to be classed with those of Pope; while his miscellaneous effusions, as numerous as they are sprightly, raise him in this sphere above any other French poet. The perspicuity of his mind appears in his *Dictionnaire philosophique* and other philosophical works; and his wit in his novels, which, notwithstanding their licentiousness, are models of their kind. His various books on history, *Charles XII.*, *Le siècle de Louis XIV.*, *L'essai sur les mœurs des nations*, are still read with profit and pleasure, while his bulky correspondence is scarcely excelled by that of Mme. de Sévigné. If Voltaire may be said to have been the master of minds, J. J. Rousseau was the master of souls. His passionate eloquence conquered the coldest and even the most prejudiced; eloquence indeed is the mainspring of all his works. As a prose writer he has no superior, scarcely an equal among the most perfect of his rivals. His first essay, *Discours contre les sciences et les arts*, which he wrote when 38 years of age, was a declaration of war against civilization; the second, *Origine de l'inégalité parmi les hommes*, was an attack upon the existing social order. In his *Emile* he drew a visionary plan of education, and in his *Contrat social* proclaimed the principles of popular sovereignty and universal suffrage. His *Nouvelle Héloïse* is a novel in which love and paradox are blended together, while his *Confessions* excited a mixed feeling of sympathy and disgust. Buffon occupied a less agitated sphere, devoting his labors to the description of nature; and his great *Histoire naturelle* is a scientific and literary monument, which time can scarcely injure. Diderot, a passionate and incorrect writer, and D'Alembert, a great geometer, founded the *Encyclopédie*, a vast review of human knowledge, often threatening to social order, always hostile to religion. Helvetius in his treatise *De l'esprit*, D'Holbach in his *Système de la nature*, Lamettrie in his *Homme-machine*, and Raynal in his *Histoire philosophique des deux Indes*, far exceeded the destructive doctrines of the encyclopædists; while other writers, such as the virtuous Vauvenargues, Condillac, a most perspicuous analytic philosopher, Mably, a bold publicist, and Condorcet, who wrote afterward an *Esquisse des progrès de l'esprit humain*, mostly kept on the side of moderation. The various branches of literature connected with philosophy were the most productive; but the others were far from being neglected, as appears from the following names which we take almost at random. Crébillon and Ducis, both tragic poets appealing, the former to terror, the latter to sympathy; Gilbert, a thorough enemy of Voltaire and the encyclopædists, and a satirist of uncommon power; Le Sage, the author of *Gil Blas*, the most perfect novel of the age, and of *Turcaret*, perhaps the best comedy next to those of Molière; Beaumarchais, whose *Barbier de Séville* was as it were the signal of revolution; Bernardin de St. Pierre, the author of *Paul et Virginie;* Duclos, Mlle. Delaunay, and St. Simon, whose *Mémoires* have gained a deserved celebrity; Barthélemy, who wrote the *Voyage du jeune Anacharsis en Grèce;* Rulhière, a historical essayist; Prévost, who produced the novel of *Manon Lescaut;* Marmontel, the author of *Bélisaire;* and Lebrun, the lyric poet. The age was not poetical; poetry had degenerated into verse-making, and the verse-makers, in imitation of Thomson's "Seasons," indulged in all sorts of descriptive pieces. Delille, the most skilful of them, gained a reputation by translating, not without a certain degree of accuracy, the "Georgics" of Virgil. Toward the end of the century imitation was the order of the day, and the only poet who was gifted with originality, André Chénier, died on the scaffold before his best effusions were published.—Neither the revolution nor the empire was favorable to literature. Some tragedies after the classical pattern, among which those of Joseph Chénier may be mentioned, a few light comedies, beside novels and short poems, were not sufficient to relieve the general dulness. Mme. de Staël and Châteaubriand were the forerunners of a revival, but the improvement was perhaps owing less to the *Corinne* and *L'Allemagne* of the former, *Le génie du Christianisme* and *Les martyrs* of the latter, than to the influence upon the public taste of the masterpieces of English and German literature, which found more and more admirers in France. The romantic school now inaugurated a new era. Through the exertions of many young and original writers new life was infused into nearly every branch of literature, poetry, history, philosophy, and the drama. An animated controversy was maintained in pamphlets and periodicals, between the supporters of reform and the adherents of the classical school; but the contest reached its utmost fury when Alexandre Dumas, Victor Hugo, Alfred de Vigny, Frédéric Soulié, and others produced on the stage dramas framed according to their own ideas of the Shakesperian style. The performances of these dramas were indeed regular battles between the opposing literary parties; and it was only at the end of several years that the younger body of combatants came out victorious. Among the plays which were thus received with both enthusiasm and censure, *Henri III. et sa cour*, *Antony*, *Tereza*, and *Angèle*, by Dumas, *Hernani*, *Marion Delorme*, *Lucrèce Borgia*, and *Le roi s'amuse*, by Hugo, are still remembered; while numberless pieces, successful at the time, have since fallen into complete oblivion. In fact, the only gain resulting from this protracted dispute was the abrogation of the obsolete rules which had so long regulated the French stage. A reactionary movement was attempted when the illustrious actress Rachel appeared with such striking effect in the tragedies of Corneille and Racine. Ponsard and Latour St. Ybars returned to the old form of tragedy; but the *Lucrèce* of the former and the *Virginie* of the latter enjoyed but ephemeral success, while the "School

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of Good Sense," as the adherents of this movement were styled, reckons only a few light comedies by Émile Augier. This school had been preceded in the tragic line by Casimir Delavigne, who, gradually deviating from the classical model, attempted to reconcile the classic and the romantic systems, in his *Marino Faliero*, *Les enfants d'Édouard*, and *Louis XI.* Meanwhile Eugène Scribe, who never gave a thought to this literary quarrel, was day by day increasing his enormous stock of successful comedies, or rather vaudevilles, on a larger or smaller scale. Novels, which, with the exception of De Vigny's *Cinq-Mars*, had been scarcely noticed during the excitement of dramatic reform, became the rage as soon as this was on the point of being accomplished. George Sand (Mme. Dudevant) acquired reputation by her *Indiana* (1832), and subsequently established her claim to be considered the most admirable stylist of her time by her subsequent performances, *Valentine*, *Lélia*, *Jacques*, *André*, *Simon*, *Mauprat*, *Consuelo*, *Le champi*, *La mare au diable*, *La petite Fadette*, *La filleule*, and *L'homme de neige*. Alexandre Dumas, the inexhaustible story-teller, has won unequalled popularity by his *Trois mousquetaires*, *Vingt ans après*, *Le vicomte de Bragelonne*, *Le comte de Monte Christo*, *Joseph Balsamo*, *Le collier de la reine*, *Ange Pitou*, *La comtesse de Charny*, and other recitals, in all filling hundreds of volumes. Eugène Sue also had his days of glory, when *Les mystères de Paris*, *Le Juif errant*, and *Martin l'enfant trouvé* depicted with glaring colors the secret and most shameful miseries of society. Honoré de Balzac undertook to present, under the title of *La comédie humaine*, a daguerreotype of every aspect of French society during his time; this immense work was interrupted by death; but some parts of it, complete in themselves, are invaluable for depth of observation and acuteness of delineation: *Eugénie Grandet*, *Le Père Goriot*, *La recherche de l'absolu*, *Le contrat de mariage*, *Modeste Mignon*, *Les parens pauvres*, *Les scènes de la vie privée*, &c. Frédéric Soulié, who, although his popularity is not as great, is nearly the equal of those we have just named, evinced uncommon talents in his historical novels of southern France, among which *Le vicomte de Béziers* specially deserves to be mentioned. Still greater power characterized his pictures from the social world: *La lionne*, *La comtesse de Montrion*, *Diane et Louise*, *Le lion amoureux*, and *Les mémoires du diable*. Alphonse Karr in his *Sous les tilleuls*, *Midi à quatorze heures*, *Geneviève*, *Clotilde*, and numerous short tales, has given unrivalled specimens of good sense, fine feeling, and genuine humor. By the originality, delicacy of style, and charm of fancy which Alfred de Musset displayed in his *nouvelles*, such as *Frédéric et Bernerette*, *Emmeline*, *Les deux maîtresses*, *Le fils du Titien*, and *Mimi Pinson*, he is entitled to a high rank as a novelist. Such is also the case with Prosper Mérimée, whose *Chronique du temps du Charles IX.*, *Colomba*, *Le vase Étrusque*, and *Arsène Guillot* are gems of their kind. Beside these masters of novel-writing we can merely mention their contemporaries, Mme. Charles Reybaud, Mme. Émile de Girardin, Théophile Gautier, Jules Sandeau, Émile Souvestre, Paul Féval, and Méry. A new generation of story-tellers has been rising within the last few years, whose powers are scarcely to be compared with their predecessors, but who, nevertheless, are not devoid of talent. Some of them belong to what they themselves call the "realist school." They are Henri Murger, Alexandre Dumas *fils*, Champfleury, Ernest Feydeau, and Gustave Flaubert. Octave Feuillet, the successful author of *Le roman d'un jeune homme pauvre*, and Edmond About deserve to be mentioned. Poetry is far from being as popular in France as the novel, and poets have been and are still very slightly regarded by the public; but four of them have such claims to admiration as to be dear even to the least poetical minds; these are Béranger, Lamartine, Victor Hugo, and Alfred de Musset. The first named, who wrote nothing but songs, is at once the most national and the most popular of all, as well as the best known in foreign countries. Although song-makers are numerous in France, there is only one who deserves to be mentioned after Béranger; this is Pierre Dupont, who, however, stands far behind his master. Lamartine, whose effusions present a happy combination of harmony, human feeling, and religious sentiment, is the great favorite of all minds that incline to sentimentality and reverie. His *Méditations*, *Harmonies*, and *Recueillements poétiques*, his *Jocelyn* and *Chute d'un ange*, have left many vestiges in the memory of his contemporaries, and are still read, admired, and learned by heart. His friend and rival, Victor Hugo, perhaps his superior in point of strength and variety, though not gifted with the same graceful charm, has written more voluminously. His *Odes et ballades*, *Orientales*, *Feuilles d'automne*, *Chants du crépuscule*, *Voix intérieures*, *Les rayons et les ombres*, and *Contemplations*, are poems of sentiment and fancy; while his *Châtiments* are bitter satires against Napoleon III. and his associates. Alfred de Musset, the most independent, and perhaps the most original, of the four, has published only two small volumes under the modest appellation of *Poésies*. His fame among the literary fraternity was great from his first appearance; his popularity is still gaining ground, but has scarcely extended beyond the limits of France. Among the many other poets Casimir Delavigne, whose *Messéniennes* rivalled for a while the success of Lamartine's *Méditations*, and Auguste Barbier, the nervous author of the *Iambes*, must not be forgotten. Of the more recent poets, the only one who can be classed in the same category is Victor de La Prade, whose elegant productions have been rewarded by his election to the French academy.—History is undoubtedly the most succes-ful branch of modern French literature. A larger number of valuable historical works have been published within the last 35 years than during any

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other equal period of time; and the taste for such performances is still on the increase. M. Guizot, the great philosophical expounder of social institutions and moral revolutions, and Augustin Thierry, the artistic historian of the middle ages, stand foremost among the promoters of this historical movement. The *Essais sur l'histoire de France*, by the former, the *Histoire de la civilisation en Europe et en France*, which he wrote before engaging actively in political life, and his *Histoire de la révolution d'Angleterre*, which he has completed since he left the ministry in 1848, are monuments of philosophical history; while the *Lettres sur l'histoire de France* of Thierry, his *Histoire de la conquête de l'Angleterre par les Normands*, his *Récits des temps Mérovingiens*, and his *Histoire de la formation du tiers-état en France*, present a happy combination of dramatic narrative and perspicuous discrimination. Three writers have devoted their efforts to a full recital of the general history of France: Sismondi, whose voluminous work is an inexhaustible mine of knowledge and thorough research; Michelet, who combines the profound learning of a Benedictine monk with the humorous fancy of a poet; and last but not least, Henri Martin, who, under the impulse of patriotic enthusiasm, has successfully embodied in his book the results of modern science, while infusing into its pages a lively and never slackening interest. De Barante, after giving (1824) in his *Histoire des ducs de Bourgogne* an attractive specimen of purely narrative history, has recently published histories of the French convention and of the directory, in which his monarchical predilections are strongly apparent. The revolutionary period has engaged the attention of many historians, among whom the most prominent are Thiers, Mignet, Michelet, and Louis Blanc. The first of the four, by his *Histoire de la révolution*, at once gained a well-deserved popularity, which gave him an introduction into political life; he is now completing his *Histoire du consulat et de l'empire*, which places him in a still higher rank as a writer and publicist. The histories of Michelet and Louis Blanc are marked with strong democratic opinions; while that of Mignet, a vivid yet substantial sketch, bears the impress of philosophical impartiality. This writer has also produced several miscellaneous historical works which are highly valued: *Histoire de Marie Stuart, Charles Quint, son abdication et sa mort, Philippe II. et Antonio Perez*, and a large compilation, *Histoire des négotiations relatives à la succession d'Espagne*, containing beautiful narratives, preceded by an admirable introduction. Lamartine also figures among the historians: his *Histoire des Girondins*, which appeared in 1847, created a deep sensation by its magnificent style and enthusiastic spirit. He has since published the *Histoire des constituants*, *Histoire de la restauration*, *Histoire de Turquie*, &c., more remarkable for showy eloquence than soundness and accuracy, as he too often contents himself with clothing in splendid language the researches of others. Such is not the case with A. de Vaulabelle, the author of an excellent *Histoire de la restauration* (1814–1830), deserving of more fame than it has gained. Great historical publications are in progress under the patronage of the government or of learned societies, the *Collection des historiens de France*, and the *Histoire littéraire de la France*, among the number. An association of professors and learned men, under the direction of Duruy, are publishing a *Histoire universelle*, adapted to the wants of the general reader; that is, a series of special histories compressed within the limits of one or two volumes, and bringing the annals of all nations to about the date of their publication. Villemain ought to be reckoned among the historians, not only for his *Histoire de Cromwell*, but above all for the admirable pictures of men and society in his excellent *Tableaux de la littérature* in the 18th century and the middle ages, and his *Souvenirs contemporains*. As a lecturer and a critic no man has contributed more to the diffusion of enlarged literary doctrines, healthy principles, and good taste.—Archæology has not been neglected, as is evidenced by the works of Letronne, Raoul-Rochette, and more recently by those of Beulé, *L'Acropole d'Athènes* and *Études sur le Péloponnèse*. Champollion threw new light upon ancient Egypt by his system of deciphering hieroglyphics. The study of oriental languages, promoted by Sylvestre de Sacy, is still successfully carried on, the most recent publications of interest being those of Ernest Renan upon the Semitic languages. The works of Abel de Rémusat have been valuable contributions to the occidental knowledge of the Chinese literature. —Moral philosophy was brought back to spiritualist principles by the natural reaction against the materialism of the preceding age. This revolution, prepared by Royer-Collard, Maine de Biran, and others, has been accomplished by Victor Cousin and his disciples, who, under the name of eclectism, unfurled the banner of spiritualism. The eloquent lectures which Cousin delivered at the Sorbonne exercised a powerful influence over the rising generation; they have been printed, with corrections and considerable additions, under the title of *Cours de philosophie, Fragments de philosophie, Du vrai, du beau, et du bien*. Jouffroy and Damiron, who acknowledged him as their master, contributed to the progress of the same doctrines, which are still advocated by Cousin's younger disciples, Émile Saisset, Amédée Jacques, Vacherot, Paul Janet, Adolphe Frank, and Jules Simon. The books of the last named, *Du devoir, De la liberté de conscience*, and *De la liberté*, are among the most meritorious performances for healthfulness of tone, honesty of purpose, and generosity of mind. Beside the eclectic school, four philosophers of great originality and uncommon power have shone each in his own sphere, viz.: Joseph de Maistre, the blunt apologist of absolute power, in his treatise *Du pape*, and the eccentric author of the *Soirées de St. Péters-*

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bourg; Bonald, who, in his *Législation primitive*, as well as his other philosophical writings, upheld the cause of monarchy and the church; Ballanche, the mystic dreamer, who, in his *Palingénésie sociale*, attempted to represent through a series of symbolical narratives couched in a poetical style the various phases of the history of mankind; and Lamennais, who, at first a bold and independent defender of the papal power, was gradually led to become the advocate of pure democracy. His *Essai sur l'indifférence en matière de religion*, *Les paroles d'un croyant*, *Le livre du peuple*, *Une voix de prison*, and *Esquisse d'une philosophie*, show the various steps of this tranformation, while they are placed among the masterpieces of French eloquence. On the publication of his first performance, he had been styled the "Christian Rousseau." The *Cours de philosophie positive* of Auguste Comte, parts of which have been reproduced in English by G. H. Lewes, Harriet Martineau, and Prof. Gillespie, offers a connected system of philosophy, embodying ideas derived from Hegel and various French socialist philosophers. Among these, St. Simon and Fourier are incontrovertibly the most conspicuous; and although their doctrines have been rejected as a whole, they have exercised a powerful influence over the present generation. Pierre Leroux is in some sort one of their disciples; and his principal work, *De l'humanité, de son principe, et de son avenir*, has commanded great attention. The historian Michelet takes rank among fanciful philosophers by his last book, *L'Amour*. The various branches of natural philosophy boast of many original and powerful writers, at the head of whom we must place Georges Cuvier, author of *Le règne animal distribué d'après son organisation*, and *Recherches sur les ossements fossiles*, with an admirable introduction entitled *Discours sur les révolutions du globe*. Cuvier's rival, Étienne Geoffroy St. Hilaire, must of course be mentioned after him. The son of the latter, Isidore, is worthy of his father, and many disciples of these great men, among whom are Duméril, Jussieu, and Alcide d'Orbigny, have been and are publishing works which expound with clearness and elegance the latest scientific discoveries. Mineralogy boasts of Élie de Beaumont, Beudant, and Dufrénoy; chemistry and physics of Thénard and Dumas, Gay-Lussac, and Despretz. French medical literature is particularly rich, from the contributions of Bichat, Broussais, Corvisart, Magendie, Trousseau, and many others. Mathematical sciences have distinguished representatives in Lagrange, Laplace, Ampère, Biot, and especially Arago, who has no equal for clearness of exposition and perspicuity of style. Among the travellers whose writings have been of most service to science or who have attracted particular attention are Freyssinet, Duperrey, Dumont d'Urville, René Caillé, Victor Jacquemont, Fontanier, and latterly Father Huc.—Many able pens have been devoted to political economy and philosophy: Michel Chevalier, whose *Lettres sur l'Amerique* have made him known in the United States, Léon Faucher, Rossi, Adolphe Blanqui, Frédéric Bastiat, André Cochut, De Beaumont, and De Tocqueville. These last two are well known in America by their books *Du système pénitentiaire aux États Unis, Marie, ou l'esclavage aux États Unis*, and *De la démocratie en Amérique*. The admirable historical essays of Laferrière upon French Jurisprudence must not be forgotten. The political writers who deserve to be named, even after the interest of the daily questions they treated is gone, are numerous. Among them are Armand Carrel; the model journalist, Courier, so familiarly known during his lifetime as *Paul Louis, vigneron, ex-canonnier à cheval;* Cormenin, his imitator, perhaps his equal in point of pungency and wit, though far from possessing the same classical perfection. The French essayists and literary critics are a legion. Silvestre de Sacy and St. Marc Girardin, who have both been admitted to the French academy, the former merely as a journalist, the latter on account of his versatile talents as a political writer, able critic, and elegant lecturer; Philarète Chasles, Cuvillier-Fleury, Ernest Renan, Hippolyte Rigaud, Henri Taine, and finally Jules Janin, the dramatic feuilletonist. Gustave Planche and Ste. Beuve are entitled to a prominent place in this class of writers; the former is a sound and unsparing critic, in the fine arts as well as literature; the latter excels in the delineation of literary characters, and has also published a *Tableau de la poésie Française au 16e siècle* and a history of the Port-Royalists. Charles de Rémusat and Albert de Broglie, regular contributors to the *Revue des deux mondes*, give their attention to historical matters from a philosophical or religious point of view. Théophile Gautier, Edmond About, Léon Delaborde, Vitet, Delécluse, have particularly devoted themselves to fine art criticism; Delécluse, Fétis, Hector Berlioz, Fiorentino, Scudo, to musical matters. The "chroniclers," who weekly talk of amusing events in society, and whose origin must be traced to the witty *Lettres Parisiennes*, which Mme. Girardin, under the assumed name of "Vicomte Delaunay," published in the journal *La presse*, have become a body by themselves, owing to Eugène Guinot, Jules Lecomte, Philippe Busoni, Henri de Pène, &c. Alphonse Karr, a moralist in the guise of a lively critic, in his monthly *Guêpes*, which are carefully preserved in book form, is always witty, sensible, and humorous. The literary movement which commenced with the restoration is now nearly exhausted; and although there has been no falling off in intellectual activity, the rising generation of writers do not seem on the whole to equal their predecessors.—See *Histoire littéraire de la France*, by Dom Rivet and other Benedictine monks, continued by members of the institute (22 vols. 4to., 1733–1858); *Histoire littéraire de la France avant le 12e siècle*, by Ampère (3 vols., 1838–'40); *Tableau de la littérature au moyen âge*, by Villemain (2 vols. 12mo., last ed., 1857); *Essais sur l'histoire littéraire du 16e siècle*, by St. Marc Gi-

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rardin and Philarète Chasles (1827); *Tableau de la poésie Française au 16e siècle*, by Ste. Beuve (1828); *Histoire de la littérature Française*, by Demogeot (new ed., 1 vol., 1857).

FRANCHI, Ausonio, an Italian author, born in Pegli, Sardinia, in 1820. From a Roman Catholic priest he became a rationalistic philosopher, and adopted the above name, his real name being Cristoforo Bonavino. In his introduction to his principal work, *La Filosofia delle scuole Italiane* (1852), he states the ground of his conversion: "When I had examined the doctrines of the various Catholic schools, I turned to the principles of the Jansenists; next I consulted Protestant systems, interrogated the philosophy of the past century, pondered the works of modern critics touching religious symbols, and the final, indisputable, unimpeachable conclusion in which my mind found rest was this: In reason resides the supreme criterion of all truth." Mittermayer in Germany, and Michelet in France, have declared him to be the best logician and critic of modern times. The titles of his works are: *La religione del secolo XIX* (1853); *Appendice della filosofia* (1853); *Il sentimento* (1854); *Il razionalismo del popolo* (1855); *Le rationalisme* (in French, with an introduction by D. Bancet, Brussels, 1858).

FRANCHE COMTÉ (free county), or county of Burgundy, an ancient province on the E. frontier of France, bounded N. by the Faucilles, and E. by the Jura mountains, S. by Burgundy, and W. by Burgundy and Champagne. Capital, Besançon. It is drained by the Saône, Doubs, and Ain, is partly covered with forests, and contains iron and coal mines, marble quarries, and salt pits. The country was originally inhabited by the Sequani, and called Maxima Sequanorum by the Romans. In the 5th century it was occupied by the Burgundians, and then became a part of the Frankish dominions; after the disruption of the Carlovingian empire it belonged to the kingdom of the two Burgundies, from which it fell to the German empire. It was then governed by its own counts, although the name of Franche Comté does not occur before the middle of the 11th century; the origin of this name is attributed to the freedom of the country from all taxes and imposts, save a certain sum granted annually to the sovereign under the title of a free gift. A little later it was also styled the palatine county of Burgundy. In 1384 it fell to the Valois house of Burgundy by the marriage of Marguerite of Flanders, who then owned it, with Philip the Bold. On the death of the last duke, Charles the Bold, it passed to the house of Austria by the marriage of his daughter Mary with the archduke Maximilian, through whose son Philip it became attached to the crown of Spain, which retained it until the latter part of the 17th century. Louis XIV. conquered it in 1674, during his war against Holland, and got definite possession of it by the treaty of Nimeguen in 1678. Franche Comté is now divided between the departments of Haute-Saône, Jura, and Doubs.

FRANCIA, Francesco, whose real name was Francesco Raibolini, a painter of the Bolognese school, born in Bologna about 1450, died in 1517, or, according to Lanzi, in 1533. He was originally a goldsmith, and at an advanced period in life turned his attention to painting. The immediate impulse to his genius seems to have been the invitation extended by Giovanni Bentivoglio to the artists of neighboring cities to adorn his palace in Bologna. Francia, zealous to uphold the honor of Bolognese art, competed with the strangers so effectively that he was held by his countrymen, according to Vasari, "in the estimation of a god." He painted some noble works for the Bentivoglio chapel, one of which, an altarpiece with portraits of the Bentivogli, is probably as fine a specimen of his style as exists. The British national gallery a few years ago purchased for £3,500 an altarpiece from the duke of Lucca's collection. Later in life Francia attempted fresco painting, of his proficiency in which he has left a notable example in the series illustrating the life of St. Cecilia, which are now unfortunately hastening to decay. His style partakes of the characteristics of Perugino and G. Bellini.

FRANCIA, José Gaspar Rodriguez, commonly called Dr. Francia, dictator of Paraguay, born there about 1757, died in Assumption, Sept. 20, 1840. He boasted that he was of French extraction, but his father is supposed to have been born in Brazil, of Portuguese descent, and to have emigrated to Paraguay as an agriculturist along with other settlers. His mother was a creole woman. He was destined for the priesthood, studied at the university of Cordova de Tucuman, was graduated as a doctor of divinity or of canon law, officiated for a short time as professor of theology, afterward applied himself successfully to the practice of the law, and gaining a reputation for ability and rectitude, he was appointed to several public offices, including that of first alcalde or mayor of Assumption. After the declaration of independence of the Paraguayans in 1811, he became the secretary of the revolutionary junta, which, beside him, consisted of two assessors and a president, Don Fulgencio Yegros. The latter and Francia were in 1813 appointed joint consuls for one year, but Francia was the moving spirit of the government. At his instigation the consulship was abolished in 1814, and he was made dictator for 3 years, at the end of which he contrived to secure his election as dictator for life. He combined in his own person the executive and the administrative powers of the government. He monopolized the cultivation of Paraguay tea, and of other products of the country, but husbanded the national resources with great sagacity, gave a powerful impulse to the rearing of horses and cattle and to the cultivation of rice and grain, and established a standing army and guard houses along the frontiers, to protect the people against attacks from the Indians. He devised a code of laws, promoted education, checked the abuses of the clergy,

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improved the appearance of the capital, and while neighboring states were in anarchy, he secured for Paraguay a comparative degree of tranquillity. He peremptorily declined all intercourse with other South American states, and almost all foreign nations, and detained all foreigners who set foot in the country. No export or import trade was allowed without the dictator's license, and death awaited those who were discovered in the act of leaving the country without his special permission. Those opposed to his rule were either shot or imprisoned. The principal victims of his administration were peculating officials, corrupt priests, and persons generally who endeavored to enrich themselves at the public expense. He was humane toward the poor, and cruel toward their oppressors, and professed to be impelled to rigorous measures by a sense of justice. He was most unrelenting toward those who were accused of a conspiracy against his life. Gen. Ramirez of Entre Rios was supposed to contemplate an invasion of Paraguay (1819). A letter from him to Yegros, Francia's former associate in the consulate, fell into the latter's hands. Yegros was charged with plotting against the country, and, with upward of 40 others, was put to death, and about 300 persons were imprisoned for 18 months, when they were only released upon the payment of a large ransom. Some of Francia's prisoners were subjected to the most cruel tortures, and the delight which he seemed to find in inflicting torment gave rise to the belief that, like some of his brothers, he was occasionally deranged. In his habits of life, too, he was peculiar. After having been fond of gambling and social and sensual enjoyments, he led a life of the utmost retirement, and Paraguay was not more isolated from the rest of the world than he from the rest of mankind. He resided in the palace of the former governors of Paraguay, attended by 4 slaves. His barber, a mulatto, was his principal channel of communication with the public, and a half breed named Patiños was his principal secretary. After the death of his master the latter was implicated in a charge of conspiracy against the government, and hung himself in prison. When riding out to inspect the public works and the barracks, Francia was accompanied by a strong escort, and armed with a sabre and a pair of double-barrelled pocket pistols. Especially toward the end of his reign he was in constant fear of assassination. He remained a bachelor until the 70th year of his age, when he was reported to have married a young French woman. He was a man of remarkable physiognomy, with dark, piercing eyes, and of great mental powers, which he cultivated by study and reading. He was especially fond of the French literature of the 18th century, and an admirer both of Robespierre and Napoleon. The anecdotes of his eccentricities were almost as numerous as the reports of his cruelties. Yet his death was deplored as a public calamity, and the people seemed to recognize in him a friend and a benefactor. His reputation as the tyrant of Paraguay was particularly aggravated in Europe by his treatment of Bonpland, whom he detained for 10 years, and by the accounts given of him by other persons whom he had interfered with. Among these were two Swiss surgeons, Rengger and Longchamp, who were detained by him from 1819 to 1825. On their return they related their observations, and at the same time expressed their dislike of Francia, in an *Essai historique sur la révolution de Paraguay et le gouvernement dictatorial du docteur Francia* (Paris, 1827). Two young Scotchmen, I. P. and W. P. Robertson, who went to Paraguay on a commercial venture, were turned out of the country by the dictator, and they gave appalling accounts of his administration in 3 works: "Letters on Paraguay" (2 vols., 2d. ed., London, 1839), "Francia's Reign of Terror" (London, 1839), and "Letters on South America" (3 vols., London, 1843). A graphic sketch of his life and character was given by Thomas Carlyle in an article in the "Edinburgh Review" (1843), in which the dictator is greatly lauded for his eccentric and ruthless energy and justice.

FRANCIS I., king of France, son of Charles, count of Angoulême (cousin german of Louis XII.), and Louisa of Savoy, born at Cognac, Sept. 12, 1494, died at Rambouillet, March 31, 1547. He married Claude, daughter of Louis XII., in 1514, and succeeded him as nearest heir, Jan. 1, 1515. Louis was meditating the reconquest of the Milanese (which he claimed as heir of his grandmother, Valentina Visconti) at the moment of his death; and the youthful king, having renewed his predecessor's treaty with England, immediately turned his eyes in the same direction, and with an army of about 40,000 crossed the Alps by passes previously considered impracticable. The Swiss army employed by the duke of Milan to defend the foot of the Alps was driven back, but being joined by reënforcements gave him battle at Marignano (Melegnano), 10 m. S. E. from Milan, Sept. 13, 1515. It was a fierce contest, since called the battle of the giants; and though the Swiss had only infantry to oppose to the finest cavalry in Europe, the sturdy mountaineers retired only on the second day with a loss of 12,000. Francis had lost 8,000 of his best troops, but he had displayed extraordinary generalship and valor; and his name became at once the most distinguished in Europe. In the chivalric spirit of the age he accepted knighthood on the spot from the chevalier Bayard, whose final charge had completed the victory. Peace was concluded with the Swiss and a concordat with the pope; and Francis, master of Milan, returned in triumph to Paris. In 1517 he made a treaty of friendship and of alliance against the Turks with the emperor Maximilian and Charles I. of Spain. Maximilian died in Jan. 1519, and Francis became a competitor with Charles I., afterward so famous under the title of Charles V. of Germany, for the imperial sceptre. Charles

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prevailed in the electoral council in consequence of a recommendation of Frederic the Wise, duke of Saxony, and Francis betrayed the passions natural to disappointed ambition. His chagrin forced from him expressions of disparagement of his successful rival, which were resented; and from this jealousy, as much as from conflicting interests, arose that hostility between these princes which kept Europe in turmoil during their reigns. It was easy to find causes of strife; Italy and Navarre afforded them abundantly. But before engaging in war, each strove to gain to his interests the English king Henry VIII., who obviously held the balance in his hand. Charles hastened to pay this monarch a personal visit at Dover as he passed from Spain to his dominions in the Netherlands, and forgot not at the same time to secure the influence of Cardinal Wolsey by a virtual promise of the papacy. Francis invited the English king to France, where, by a splendid hospitality, he hoped to gain both the cardinal and his master. The sumptuous interview took place in the plain between Guines and Ardres, which history commemorates as the field of the cloth of gold (1520). Unprecedented magnificence, feats of chivalry, and gallant exercises of every description, occupied the two courts. The kings themselves, according to Fleuranges, had a personal wrestling match, in private. Francis easily overthrew his antagonist, but by his frank and generous bearing failed not to win the friendship of his royal brother. Henry, however, flattered by the wily Charles, whose visit he returned after his conference with Francis, was easily secured to the interest of the emperor, and declared that he wished to remain impartial, but should pronounce against the aggressor. The French king began hostilities by seizing Navarre. His troops also invaded Spain, but were routed and chased beyond Navarre. Charles attempted to enter France from the north. He was repelled at Mézières by the chevalier Bayard, and Francis marched into the Low Countries. By some strange over cautiousness he lost an opportunity of cutting off the whole imperial army. Meanwhile Cardinal Wolsey effected a league between his sovereign, the emperor, and the pope, against Francis. A papal army, under Prosper Colonna, seized Milan, and dispossessed the French of all their Italian conquests, except the fortress of Cremona. Francis, in the midst of these disasters, received from Henry of England a declaration of war (May 29, 1522). Undaunted, however, although his treasury was utterly exhausted, he succeeded in putting the kingdom in a state of defence. The constable de Bourbon, at this crisis, rejecting the queen mother's invitation to marriage, and robbed by the incensed woman, through legal chicanery, of his family estate, not only offered his sword to the emperor, but proposed to incite a rebellion in France. The conspiracy was discovered, and Bourbon fled; but Francis, uncertain of its extent, was compelled to abandon his bold plan of carrying the war into Italy. He nevertheless despatched an army of 30,000 men, under Bonnivet, against Milan, which failed through the incapacity of the commanding general. Bourbon principally conducted the imperial operations in this quarter, and in conjunction with Pescara (1524) drove the French, after a rout at Biagrossa, into their own country. The retreat was fatal to the chevalier Bayard, who, strange to say, after having saved France at Mézières, was nevertheless subordinate to Bonnivet. The imperialists entered Provence. Francis hastened in person to relieve Marseilles, carried all before him, pursued the enemy again into Piedmont, and laid siege to Pavia. He was here defeated in a great battle, Feb. 24, 1525. His Swiss allies fled; and Francis, unhorsed, after fighting foremost in his brave army, and killing with his own hand 7 of the enemy, at length yielded his sword to the Neapolitan viceroy Lannoy, who received it on his knees, and was hurried a prisoner to Madrid. *Tout est perdu, fors l'honneur*, he had written to his mother from the field; but it is a question with historians whether the honor there saved was not lost at the Spanish capital. Europe was filled with alarm. The emperor's unworthy behavior to his gallant captive, far less, however, than his growing power and ambition, roused the animosity of Henry of England, who now declared for France, and demanded the liberation of the king, as did also Rome, Venice, Florence, and Genoa. But the emperor insisted on large cessions of territory, the restoration of Bourbon to all his rights, the marriage of Francis with Charles's sister Eleanor, queen dowager of Portugal, and the delivery of his two eldest sons as hostages for his good faith. Francis at last signed a treaty on these conditions, but at the same time caused a secret protest against them to be drawn up, and was liberated March 17, 1526, his sons taking his place at Madrid. He at once demanded and obtained from the pope absolution from his oath to fulfil the treaty, and, gracefully thanking the English king for his sympathy and alliance, sent forth armies again to Italy. If, say French historians, he was guilty of perjury, then was every man in France his accomplice. Charles, overreached, and now opposed by all Italy as well as France and England, sent Bourbon with an army of mercenaries against the pope. Rome was sacked with unparallelled barbarity, and the pope was imprisoned. A French army, meanwhile, under Lautrec, hastened to avenge the insulted pontiff, but after a series of triumphs was destroyed by disease before Naples. Peace, an obvious necessity for all the belligerents, was concluded at Cambrai by the mother of Francis and the aunt of Charles (Margaret of Austria) in July, 1529. The king of France retained Burgundy, surrendered his Italian claims, and paid 2,000,000 crowns ransom for his sons. The French courtiers vied with each other in supplying the ransom money. Francis at the same time married Queen Eleanor; but

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no pledges could secure peace. In 1533 the duke of Milan put to death an agent of the king of France, charged with murder. Seizing this as a pretext for war, Francis took up arms again, and in 1535 overran Savoy. Charles in the spring of 1536 marched upon Provence, and the French troops hurried again to the defence of that region. Charles lost half his army through famine and disease, the country having been laid waste purposely by the French commander, and with the remainder fled before the light troops of the province. At the same time the prince of Nassau, who had invaded the north of France, was compelled to retreat. Soon after these events, the eldest son of Francis died, poisoned. The crime was laid to the charge of the emperor, probably without any foundation; but the circumstance carried the exasperation of the two sovereigns to the extreme of decency. Francis attacked the Low Countries, and even formed an offensive alliance with the Turkish sultan Solyman; but the pope and the queen of Hungary interposing with offers of mediation, a truce of 10 years was concluded at Nice (1538). The rivals exchanged visits and embraced; and on the occasion of a second visit Charles promised to invest a son of the French king with the sovereignty of Milan, but the promise was never fulfilled, Charles giving the duchy instead to his son Philip. War again broke out in 1542, and Francis sent 5 armies against various quarters of the imperial dominions, and gained a great battle at Cerisolles (1544), but without important consequences. After a short and bootless invasion of France by Henry VIII. and Charles in alliance, peace was again concluded; and no further military events took place during the reign. The king's health had been hopelessly ruined some years before in consequence of one of his many amours, and death at length ensued. Francis was an unhesitating libertine, though during the latter years of his life his attention was given to wiser thoughts; and notwithstanding his vices and his cruelty to the Protestants, admiration cannot be withheld from many gallant and noble traits of character, which might have been blessings to his country had he been content with any other than military glory. He introduced into France striking improvements of art and learning. He was gifted with remarkable elegance and grace. In youth he was the *magnus Apollo* of his comrades, "the courtier's, scholar's, soldier's eye, tongue, sword." Of his munificence many monuments remain; as the imperial library of Paris, the imperial college, the original Louvre, Fontainebleau, and Chambord. By his first wife he had 7 children; by the second none. To his son Henry II. he bequeathed a treasury with a surplus of 400,000 crowns.

FRANCIS II., king of France, born in Fontainebleau, Jan. 19, 1543, died in Orleans, Dec. 5, 1560. He was the eldest son of Henry II. and Catharine de' Medici. His father, more brave than wise, more devoted to amours and chivalric amusements than to the management of affairs of state, had yet succeeded in obtaining some important advantages over the emperor Charles V. and the house of Spain, and in terminating favorably a long series of wars, chiefly in Italy and the Netherlands, against the growing might of that house. Henry died in 1559 of a wound accidentally received in a tournament. Francis, then a boy of 16 years, possessed of neither character, strength, nor talent, succeeded to the throne. He had already married the daughter of James V. of Scotland, the beautiful and afterward unhappy Mary Stuart. Her influence gave the reins of government to her uncles, Francis duke of Guise, and the cardinal of Lorraine. The arrogant sway of these two ambitious and unscrupulous princes alarmed and irritated the princes of the blood, Anthony king of Navarre, and his brother Louis of Condé, who became the leaders of a Protestant party in opposition to the court. Every thing concurred to produce civil commotion. Protestantism had penetrated, in the form of Calvinism, into France. Its spirit suited that of the feudal nobility, and the profligacy and corruption introduced by the Italian Medicis into the court and manners of France, and the influence of strangers, disposed the people to rebellion. It was by secret plots, however, rather than by open revolt, that the Protestant princes tried to wrest power from the hands of the Guises. Assisted by the duke of Montmorency, La Renaudie, and others, they framed the conspiracy of Amboise, in which they agreed to enter that place on a certain day in detached parties, to massacre the Guises, and seize the person of the king. But the plot was denounced almost at the moment of execution, by two Protestants; the duke of Guise secretly assembled a body of troops, and cut to pieces the forces of the conspirators as they were entering the city. His triumph was stained with barbarous cruelty, and the waters of the Loire were colored with the blood of those who fell in combat or perished on the scaffold. The court was depraved or bigoted enough to gaze at the executions, as scenes of public festivity, from platforms and the windows of the castle. Arrests and executions throughout the country followed. The duke of Guise was made lieutenant-general of the kingdom. The axe was brought into play to stifle the opposition of the princes, and the inquisition was set up to repress Calvinism. A royal edict made the bishops, instead of the parliaments, judges of heresy; the chancellor De l'Hôpital gave his consent, led by reasons of humanity and caution, and having sufficient proof of the persecuting spirit of the parliaments. But at the same time, and for the same reasons, he urged the calling of a general, or, if the pope refused, of a national council, to pacify the church and France. The princes of Lorraine, desirous of completing their victory by the death of Condé, convened the states-general at Orleans. Condé had tried to dissemble his mortification after the failure of Amboise, and was now impru-

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dent enough to appear. He was arrested, tried, and soon condemned to die as a traitor. The death of Francis, however, saved his life, and restored him to the leadership of the Huguenots. The young king had long suffered from an abscess in his ear, and died after a reign of 17 months, so suddenly that rumors of poison, now regarded as unfounded, spread, and were believed throughout the country; the more easily, as assassination was becoming fashionable in France, and the queen mother was renowned for her love of alchemy and the use of poisons. Francis bequeathed to his brother and successor, Charles IX., then a boy of 10 years of age, a treasury loaded with debt, and a state full of the elements of civil war. The regency was intrusted to Catharine de' Medici, whose intrigues fostered the flame of civil and religious dissensions.

FRANCIS I. (STEPHEN), emperor of Germany, born in 1708, died Aug. 18, 1765. He was the son of Leopold, duke of Lorraine, and of a niece of Louis XIV., and the great-grandson of Ferdinand III., emperor of Germany. In 1729 he succeeded his father as duke of Lorraine and Bar, but in consequence of the war of the Polish succession, in which Louis XV. took a feeble part in support of his father-in-law, Stanislas Leszczynski, the dethroned king of Poland, his duchy was exchanged for Tuscany, where the house of Medici was on the point of becoming extinct, and given to Stanislas, to revert after his death to the crown of France. Francis soon after married Maria Theresa, daughter and heiress of the emperor Charles VI. Charles appointed him generalissimo, and he fought in a successful campaign against the Turks. After the death of the last of the Medicis, he went with Maria to Florence, the capital of his new dominion, and returned with her after the death of Charles, to share with her the regency, the cares, but not the prerogatives of the inherited crowns. He fought for her rights in the wars which now ensued in spite of the pragmatic sanction, and which would have deprived her of her inheritance had she not been stoutly supported by her Hungarians, who swore at Presburg to die for their "king Maria Theresa," and found an ally in George II. of England. Frederic the Great of Prussia was satisfied with the glory won in the wars of Silesia, and the conquest of that province, and Charles of Bavaria, who had been chosen emperor, died in 1745. Francis could now be elected, and was acknowledged in the peace of Aix la Chapelle as emperor of Germany (1748). Being of a mild and peaceful disposition, and influenced more by personal avarice than by ambition, he promoted commerce and agriculture, particularly in Tuscany, but left the heavier cares of government to his masculine consort, who was soon again involved in a 7 years' war with Frederic. Two years after the termination of this war Francis died at Innspruck, leaving the German crown to his son Joseph II., for whom his mother reigned till 1780, and Tuscany to his younger son, afterward Leopold II.

FRANCIS II., emperor of Germany (I. of Austria), born in Florence, Feb. 6, 1768, died in Vienna, March 2, 1835. He was the son of the emperor Leopold II. and of Maria Louisa, daughter of Charles III., king of Spain. He was educated first at the polished and popular court of Florence, then at that of Vienna, where he had an opportunity of studying the statesmanship and reign of his uncle, Joseph II. He accompanied him in his unsuccessful campaign against the Turks, and even took the title of commander-in-chief of the army, though still a youth of 21 years, while the old and experienced general Laudon served as an assistant. After the death of Joseph (1790), Francis held the reins of the empire for a few days, till the arrival of his father from Florence, whom he followed in the next year to the convention of Pilnitz, where the emperor and the king of Prussia formed the first coalition against revolutionary France. The short and mild reign of Leopold ended in 1792, and Francis succeeded him in his hereditary dominions, and was successively crowned king of Hungary, emperor of Germany, and king of Bohemia, but was soon surrounded with difficulties and dangers. Hungary, stripped of its constitutional privileges by the centralizing and Germanizing efforts of Joseph, and not fully appeased by the concessions of Leopold, was in a state of national excitement, and the Belgian provinces were ripe for revolt. The legislative assembly of France obliged Louis XVI. to declare war against the young king of Hungary and Bohemia in April, 1792. The victories of Dumouriez and the revolt of Belgium, the victories of Custine on the Rhine, the execution of Louis XVI., and that of the queen Marie Antoinette, the aunt of Francis, followed in rapid train. It was in vain that Clairfait obtained some advantages over the French, that Francis took the command in person, and was for a time successful, that a new and mightier coalition was formed; the armies of the republic soon drove back the allies; Francis's confederates deserted him, and in 1795 Tuscany, Sweden, Spain, and even the king of Prussia, concluded at Basel a treaty of peace with the republic, whose Italian army, now commanded by Gen. Bonaparte, conquered in the two next years the whole north of Italy. Francis himself, notwithstanding some slight advantages gained hy his brother the archduke Charles over Moreau, in southern Germany, was finally forced to conclude the treaty of Campo Formio (Oct. 17, 1797), in which he sacrificed Belgium, Milan, and a Rhenish province of the empire, in exchange for Venice. Changes in France and new French aggressions tempted Austria, Russia, and England to another war. The allied armies were successful for a while under the archduke Charles in Germany, under Hotze in Switzerland, and under Kray and Suwaroff in Italy. But reverses came; Suwaroff was recalled by his emperor, and Bonaparte, returning from Egypt, became master of France by a *coup d'état*, and of Italy by the passage of

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the Alps and the battle of Marengo (June 14, 1800), while Moreau fought his way through southern Germany toward Vienna. These disasters compelled Francis to the peace of Luneville, by which he lost a portion of Germany and acquired a portion of Italy. England made peace with France at Amiens, but broke it again, and framed a new coalition, in which the emperors Francis and Alexander and the king of Sweden took part, while Prussia remained neutral, and Bavaria, Würtemberg, and Baden were ready to side with the French. Francis expected the first attack from Italy, and sent thither his brother Charles, who gained a battle over Masséna; but Napoleon broke through Germany, and his sudden marches, the surrender of Ulm with its 24,000 men under Mack, the retreat of the archduke Ferdinand, and the great battle of Austerlitz (Dec. 2, 1805), in which the two allied emperors were present, made him the dictator of the treaty concluded at Presburg, in which Francis lost the Tyrol, Venice, and 3,000,000 subjects, and received only Saltzburg. The electors of Bavaria and Würtemberg now took the title of kings as a reward for their support of the victor; the confederation of the Rhine was founded under Napoleon's protectorate, and the French ambassadors declared that they no longer recognized a German empire or a German constitution. Francis, who had already assumed the title of hereditary emperor of Austria, solemnly laid down that of emperor of Germany in Aug. 1806. But Napoleon, having crushed Prussia, Portugal, and Italy, threatened Austria again. Francis armed the ancient German militia, and resorted to the general rising of the Hungarian nobles. Three brothers of the emperor were sent with armies across the German, Italian, and Polish frontiers; but Austria stood this time alone, while Napoleon was assisted by Poles, Russians, and Germans. With the exception of the battle of Aspern and Essling, May 21 and 22, 1809, in which Napoleon suffered his first defeat, the whole campaign in Germany was a series of French victories. The Austrians were forced to evacuate Vienna, driven from Poland, and signally defeated at Wagram; the Hungarian nobles were dispersed, and a rising of the Tyrolese in favor of Austria proved abortive. The peace of Schönbrunn cost Francis some rich provinces, and more than 3,500,000 subjects. The resources of his empire were exhausted, and his treasury had long been bankrupt. In this situation he consented to give his daughter Maria Louisa in marriage to Napoleon, and soon saw the title of king of Rome, once his own, bestowed upon her child. But the power as well as the presumption of Napoleon had now attained its highest pitch. In the disastrous Russian campaign of 1812 an auxiliary Austrian force occupied Poland in the French interest, but effected little. In 1813 Francis declared his neutrality, and on Napoleon's refusal to accept his mediation with Russia he joined the allies, and contributed largely to their victory at Leipsic. In the following year he entered France with his army, and remained two months in Paris after its occupation by the allies, March 31. In June the European congress assembled at Vienna, but the brilliant festivals with which Francis entertained his guests were interrupted in March, 1815, by the news of Napoleon's return from Elba. An Austrian army now crossed the Simplon and occupied Lyons, while another marched into Italy, overthrew Murat, and restored to the old king Ferdinand the crown of Naples. On the restoration of peace after the battle of Waterloo, Francis, having ceded Belgium to the Netherlands, and acquired Lombardy and Venice, saw his empire greater than it had ever been before. His policy, developed by Metternich, became the policy of Europe. Based on a horror of revolution, and a reverence for hereditary right, it took the form of a thorough conservatism and centralization, supported by a large standing army, a secret police, strict subordination, a literary censorship, and all the measures of repression familiar to an arbitrary government. Austria was the centre of all the reactionary movements of the period following the French restoration. Monarchical congresses for the suppression of the revolutionary spirit of Germany, Spain, and Italy were held on its territory at Carlsbad in 1819, at Troppau in 1820, at Laybach in 1821, and at Verona in 1822; Austrian armies restored order in Piedmont and Naples, and Austrian influence prevailed in Spain, Portugal, and the German confederacy at Frankfort. Francis sanctioned even the despotic rule of Turkey over Greece, and imprisoned the Greek refugee Ypselantes. He was the first to counteract in Italy the influence of the French revolution of July, 1830, and was of aid to Czar Nicholas in the Polish war of independence in 1831. It was nevertheless a constant though secret part of his policy to check the growing and threatening power of Russia. At home his chief embarrassments sprang from an exhausted treasury, enormous debts, and the uneasiness of the Italians, Hungarians, and Slavi. New loans and taxes relieved his finances; state prisons and rigorous punishments were used to crush the spirit of independence in Italy; while the diet of Presburg was appeased by reluctant concessions, and German officials kept order in Poland and Bohemia. In the promotion of industry, commerce, and the arts in the German provinces, and the advancement of German influence, he showed a wiser policy. The courts of law were reorganized, and the ancient codes were revised and modified. Francis was economical, industrious, and regular in his personal habits, popular with the Germans, but little known and less liked by his other subjects. The antipathies inspired by the reactionary measures of his government, and the attacks of the liberal press in foreign countries (for there was none in Austria), and of the Hungarian patriots in their diets and county assemblies, were directed less against the emperor than against his minister Metternich. His private treasury was in an incomparably better condi-

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tion than that of the state, and his family was large and prosperous. The latter part of his reign was undisturbed. Of his 4 wives, princesses of Würtemberg, Sicily, Modena, and Bavaria, the second, Maria Theresa, was the mother of 13 children, among whom were Maria Louisa, wife of Napoleon I., Ferdinand, who succeeded to the throne, and Francis Charles, the father of the present emperor, Francis Joseph I.

FRANCIS JOSEPH, the reigning emperor of Austria, grandson of the preceding, eldest son of the archduke Francis Charles, and nephew of Ferdinand I., born Aug. 18, 1830. He was educated under the care of Count Bombelles, and was early inspired with ambition by his mother, the archduchess Sophia, daughter of the king of Bavaria and sister of the queens of Prussia and Saxony, a handsome, energetic, and unscrupulous woman, who possessed more influence and enterprising spirit than either the emperor himself or her husband, the heir presumptive to the throne. Like his uncle Ferdinand, he was taught to speak the various languages of his polyglot empire, and also became a skilful rider and fond of military displays, without however evincing any particular talent. Sent to Pesth in 1847 to install his cousin Stephen as palatine of Hungary, he spoke Hungarian to the assembled nobles, and even gained some popularity. This, however, was of short duration. The revolutions of 1848 having brought the Austrian empire to the brink of dissolution, his mother became the leading spirit in the counter-revolutionary plots which saved it. Francis Joseph was sent to the army of Italy, and was favorably mentioned in some reports of Gen. Radetzky. Lombardy having been reconquered by that general, Prague and Vienna subdued by Windischgrätz, and the Hungarians defeated before Vienna, it seemed to the archduchess Sophia that the moment had arrived for completing her work. Francis Joseph was declared of age, Dec. 1, 1848, at the temporary court of Olmütz, and on the following day his father resigned his right to the succession, and the emperor his crown, in favor of the youthful prince. Hungary had still to be conquered, and a constituent Austrian parliament was assembled at Kremsir. The young emperor in his inaugural proclamation promised a constitutional, progressive, and liberal reign. Its beginning was successful. The Hungarians under Görgey retreated before Windischgrätz, giving up Presburg, Raab, and finally (Jan. 5, 1849) Buda and Pesth; Guyon and Perczel were routed; Schlick was victorious in the north of Hungary. The battle of Kápolna (Feb. 26, 27), which was announced by Prince Windischgrätz as a decisive victory over the united main army of the rebels, was believed to have given the finishing blow to the revolution in Hungary. On receiving this news the emperor dissolved the Austrian parliament, ordered the arrest of its liberal members, and promulgated a new constitution of his own (*octroyirte Verfassung*), known as the constitution of March 4. But on the very next morning the victory of Damjanics at Szolnok destroyed at once the delusions of Windischgrätz, and now the imperial army suffered defeat after defeat in Hungary and Transylvania. Radetzky, however, was again victorious over Charles Albert in Italy (March 23). To subdue Hungary foreign aid was necessary. Francis Joseph, therefore, went to Warsaw to invoke the assistance of the czar Nicholas. This was granted, and Hungary was soon invaded from every quarter. Francis Joseph himself went for some time to that country, and was present at the taking of Raab (June 28). After the fall of the revolution, its leaders who had surrendered were punished with unmitigated severity. One day (Oct. 6) witnessed the execution of Count Batthyanyi, the Hungarian Egmont, at Pesth, and of 13 generals at Arad, all of whom had voluntarily surrendered. The dungeons of the empire were filled with victims. Görgey alone was spared. Soon after the surrender of Venice (Aug. 23) and Comorn, which inaugurated the unlimited centralizing sway of the minister of the interior, Bach, Prince Felix Schwarzenberg resumed with new energy the management of foreign affairs. The revolutionary schemes of a German union apart from Austria had been defeated; now the schemes of Prussia for forming a separate union with a number of smaller German states were discomfited. In Oct. 1850, Francis Joseph mustered his south German allies at Bregenz, and in Nov. Prussia yielded to their threatening attitude. Austrian influence prevailed in restoring the ancient order in the electorate of Hesse and in Schleswig-Holstein, as well as the ancient federal diet at Frankfort. After the death of Schwarzenberg, who was succeeded by Count Buol-Schauenstein as minister of foreign affairs, Francis Joseph renewed his friendly relations with Frederic William IV. in an interview at Berlin (Dec. 1852), which was followed by a treaty of commerce (Feb. 1853). In the meanwhile absolutism was gradually reëstablished within the empire. The national guards were dissolved, the freedom of the press put down, and finally the constitution itself, which had never been in operation, abolished (Jan. 1, 1852) The unfavorable reception which the emperor met with in Hungary on a journey undertaken in the autumn of the same year proved that that country felt, as it was treated, as a conquered province. An outbreak at Milan (Feb. 6, 1853), which was suppressed by Radetzky, evinced the revolutionary spirit of Lombardy, On Feb. 18 of the same year, while walking on the public promenade of Vienna, the emperor was furiously attacked with a knife by a young Hungarian tailor, named Libényi, who had for months meditated and coolly prepared for this deed. The wound inflicted was regarded as threatening to the life, and afterward to the sight, of the monarch, who, however, slowly recovered. Libényi, who had been disarmed with difficulty, died on the gallows

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protesting his fidelity to republicanism and Hungary. A few months afterward Czar Nicholas paid Francis Joseph a visit at Olmütz, but the attitude of the latter in the war in Turkey, which soon followed, and during which he concluded a treaty with the allies (Dec. 2, 1854), occupied the Danubian principalities, and concentrated a large army in Galicia, was far from satisfying either Russia or her enemies. The treaty of Paris (1856), which terminated the great struggle, was signed on the part of Austria by Buol and Hübner. The expenses of all these diplomatic and military undertakings were met by means of extravagant and often violent financial operations. In April, 1854, Francis Joseph married Elizabeth, daughter of the Bavarian duke Maximilian Joseph of Zweibrücken-Birkenfeld, who in 1855 bore him a daughter, Sophia, in 1856 another, Gisela, and in 1858 a son, Rudolph. All these family events were followed by partial and scanty political amnesties. The first born child died during a second imperial journey through Hungary, in 1857, at Buda. In October of the same year Francis Joseph received a visit at Vienna from Alexander II. of Russia, which quieted the apprehensions caused by a preceding interview of the same monarch with Napoleon III. at Stuttgart. While Austrian diplomacy was thus successful in its various operations, it was most effectually active in Italy. A concordat concluded with the see of Rome (1855), which conferred extraordinary rights upon the Roman Catholic bishops and the Jesuits, and private treaties with Tuscany, Parma, and Modena, made Austrian influence predominant in the peninsula. Beyond the Po, Austria held the important military positions of Ancona and Piacenza. To counterbalance this state of things, Sardinia strengthened herself by increasing her army, by enlisting the sympathies as well as the refugees of the other Italian states, and finally by an alliance with Napoleon III. On New Year's day, 1859, the emperor Napoleon declared to the diplomatic corps in Paris his dissatisfaction with the Italian policy of Francis Joseph, and his few words were understood by Austria as a threat, if not as a declaration of war. On both sides the most active preparations for a great struggle began. Napoleon demanded from Austria the surrender of her private treaties with the Italian states, and the evacuation of all non-Austrian territories in Italy; Austria demanded from Sardinia a disarmament and the expulsion of the refugees. None of these demands was agreed to. The alarmed English ministry in vain offered its mediation. The proposition to call a European congress, made by Russia, was agreed to by Napoleon, but rejected by Francis Joseph, who objected to the admission of Sardinia in the congress. Austrian reënforcements were pouring into Lombardy; French troops began to cross the Alps, and to sail from Marseilles for Genoa. At this juncture Francis Joseph surprised the world by sending an ultimatum to Sardinia, April 19, granting but 3 days for a compliance with his conditions, and by the commencement of hostilities immediately following its rejection. The Austrians, under Count Gyulai, crossed the Ticino (April 26, 27), and occupied the N. E. provinces of Piedmont as far as the Dora Baltea, while their left wing was advanced as far as Bobbio on the Trebbia. They thus threatened both Turin and Genoa; but every thing soon took an unfavorable turn for them. On the very first day of the war a bloodless revolution broke out at Florence, in consequence of which the grand duke left Tuscany, and the country was placed under the military dictatorship of Victor Emanuel, the king of Sardinia. Similar movements soon after drove the duke of Modena and the duchess of Parma into exile. The overflowing tributaries of the Po, and probably want of decision, prevented a bold stroke against the Sardinians before the approach of the French and the arrival of their emperor. After the first vigorous repulse suffered from the French at Montebello (May 20), the Austrians gave up the offensive, retiring toward the Ticino and Piacenza. The allied armies closely followed, commanded by the respective monarchs in person. Victor Emanuel, on the left, crossed the Sesia, and won the battle of Palestro (May 31); Garibaldi at the head of a troop of volunteers was allowed to enter Lombardy, and to rouse the mountaineers of the lake region; while, masked by a false display on the right, Napoleon transferred the main bulk of his army behind the line of the Sardinians to the banks of the Ticino, which he crossed at Turbigo and Buffalora (June 3), before the Austrian commanders perceived their mistake. Recrossing the Ticino in haste, but too late, they threw themselves unsuccessfully upon Buffalora, and suffered the first great defeat at Magenta (June 4). Francis Joseph, arriving from Vienna, reached his army after the evacuation of Milan (June 5). A general retreat was now begun, interrupted only by the battle and defeat at Melegnano (June 8). Piacenza and Pizzighettone with their fortifications, the lines of the Oglio and Chiese, as well as Ancona and Bologna, were given up without a blow. Lombardy, Parma, and Modena proclaimed their annexation to Piedmont. Arrived on the banks of the Mincio, the retreating army once more turned against the closely following enemy, and Francis Joseph, having dismissed Gen. Gyulai, held the chief command in person in the great battle of Solferino (June 24), in which nearly half a million of combatants were engaged for a whole day, on a line extending from the lake of Garda to the vicinity of the Po. The victory of the allies was, as in every preceding battle, dearly purchased, but it conquered the line of the Mincio. Francis Joseph retired to Verona, followed by his army, and soon after by that of the allies. The armies were in sight of each other; the French fleet was threatening Zara, Fiume, and Venice, Kossuth preparing to revolutionize Hungary, Prus-

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sia mobilizing her armies, apparently in favor of Austria, when a sudden armistice, and immediately preliminaries of peace, were concluded between the two emperors, the latter at a personal interview in Villafranca (July 11). This treaty gave Lombardy as far as the Mincio to Sardinia, leaving the 4 great fortresses of Mantua, Peschiera, Verona, and Legnano in the possession of Austria. It also provided that Italy should be reorganized as a confederacy of states under the honorary presidency of the pope. Before leaving Verona for his capital (July 14) Francis Joseph published an order of the day, in which he throws the blame of his defeat on the standing aloof of his natural allies, and expresses his confidence in the devotedness of the army if any new struggle should arise. A conference for the final settlement of the new treaty was held in Zürich immediately afterward.

FRANCIS, John Wakefield, an American physician and author, born in New York, Nov. 17, 1789. His father was a German who emigrated to this country soon after the peace of 1783, and his mother a Philadelphia lady of Swiss family. In his youth he was for some time in the printing establishment of George Long. Subsequently, however, having been carefully prepared by the Rev. George Strebeck, and the Rev. John Conroy, of Trinity college, Dublin, he entered an advanced class at Columbia college, and about the same time (1807) began to study medicine under Dr. Hosack. He was graduated A.B. in 1809, and M.D. by the college of physicians and surgeons in 1811, being the first person upon whom a degree was conferred by the latter institution. A few months afterward Dr. Hosack offered his young pupil a partnership, and the connection thus formed, extending not merely to professional, but also to literary and other pursuits, lasted until 1820. In 1810, while yet a student, he issued, in conjunction with Dr. Hosack, the prospectus of the "American Medical and Philosophical Register," which was published quarterly and continued for 4 years. In 1813 Dr. Francis was appointed lecturer on the institutes of medicine and materia medica at the college of physicians and surgeons, and soon afterward, the medical faculty of Columbia college having been consolidated with that institution, he received the chair of materia medica in the united body. He would accept no fees for his first course of lectures, fearing lest the increased expenses of the new establishment might exclude some who wished to attend the full course. With the design of both completing his own studies and transferring to the medical schools of New York some of the most valuable features of those abroad, he visited Europe, where he became acquainted with Cuvier, Gall, Denon, Dupuytren, Gregory, Playfair, Brewster, Bell, the Duncans, Jameson, Abernethy, the Aikins, Sir Walter Scott, and Dr. Rees, to whose cyclopædia he contributed several articles. On his return to New York, the chair of materia medica having been added to that of chemistry, he became professor of the institutes of medicine, and in 1817 succeeded Dr. Stringham as professor of medical jurisprudence. In 1819 he was made professor of obstetrics in addition to his other duties, and retained this appointment until 1826, when the whole faculty resigned, and a majority of them founded the Rutgers medical school, which, after a successful career of only 4 terms, was closed by the legislature. In this institution Dr. Francis filled the chairs of obstetrics and forensic medicine. Since his retirement from this post he has devoted himself to the practice of his profession and the pursuit of literature, neither of which indeed he had allowed his academical duties to interrupt. In conjunction with Drs. Beck and Dyckman he edited, in 1822, '3, and '4, the "New York Medical and Physical Journal." He actively promoted the objects of the New York historical society, the woman's hospital, the state inebriate asylum, and the cause of natural history, the typographical guild, and the fine arts, in behalf of which he has frequently written and spoken. In addition to biographical sketches of many of the distinguished men of the last half century with whom he has been in intimate relationship (among others, of Robert R. Livingston, Philip Freneau, Daniel Webster, J. Fenimore Cooper, Cadwallader Colden, Samuel L. Mitchill, Edward Miller, John Pintard, and the actors Cooke and Kean), and articles in different medical periodicals on obstetrics, vitriolic emetics in croup, *sanguinaria Canadensis*, iodine, the goitre of W. New York and Canada, on medical jurisprudence, yellow fever, death by lightning, caries of the jaws of children, elaterium, ovarian disease, &c., he has published an essay on the "Use of Mercury" (8vo., New York, 1811); "Cases of Morbid Anatomy" (4to., 1814); "Febrile Contagion" (8vo., 1816); "Notice of Thomas Eddy the Philanthropist" (12mo., 1823); "Denman's Practice of Midwifery, with Notes" (8vo., 1825); "Address before the New York Horticultural Society" (1830); "Address before the Philolexian Society" (1831); "Letter on Cholera Asphyxia of 1832" (8vo., 1832); "Observations on the Mineral Waters of Avon" (1834); the "Anatomy of Drunkenness;" "Discourse before the N. Y. Lyceum of Natural History" (1841); discourses before the N. Y. academy of medicine (1847, 1848, and 1849); addresses before the typographical society of New York, "On Dr. Franklin" (1850 and 1859), and "On the Publishers, Printers, and Editors of New York;" "Old New York, or Reminiscences of the past Sixty Years" (8vo., 1857; 2d edition, enlarged, 12mo., 1858). A memoir of Christopher Colles, read by him before the historical society in 1854, was published in the "Knickerbocker Gallery" in 1855. His discourse at the Bellevue hospital, 1858, embraces a minute view of the progress of anatomical investigation in New York from its early state under the Dutch dynasty down to the present time. He was elected the first president of the New York academy of medi-

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cine after its organization in 1847; he is a foreign associate of the royal medico-chirurgical society of London and other institutions abroad, and in fellowship with many scientific bodies in his native land. In 1850 he received the degree of LL.D. from Trinity college, Hartford, Conn. His style is animated, excursive, and often enlivened by humor, while his intimate acquaintance with the history and old inhabitants of New York, and his fondness for local antiquities, cause him to be looked upon as an oracle in matters relating to his native city.—John W., jr., son of the preceding, born in New York, July 5, 1832, died there, Jan. 20, 1855, was graduated at Columbia college in 1852. A "Memorial of his Life," by Henry T. Tuckerman, was published in New York (1 vol. 8vo., 1855).

FRANCIS, Sir Philip, a British politician and pamphleteer, born in Dublin, Oct. 22, 1740, died in London, Dec. 22, 1818. He was the son of the Rev. Philip Francis, author of an elegant and popular translation of Horace, and also of several tragedies of little merit, and some liberal political pamphlets. The son removed with his father to England in 1750, and was placed on the foundation of St. Paul's school, where he remained about 3 years. Here Woodfall, afterward the printer of the "Public Advertiser," and the publisher of the "Letters of Junius," was his fellow pupil, a circumstance much relied upon in the effort to prove Sir Philip the author of those letters. In 1756 he was appointed to a place in the office of his father's patron, Mr. Fox, then secretary of state, which he continued to retain under the secretaryship of Mr. Pitt. He was, in fact, a successful placeman. In 1758 he went as private secretary to Gen. Bligh when that officer commanded an expedition against the French coast, and was present in a battle near Cherbourg. When the earl of Kinnoul went in 1760 as ambassador to Portugal, on the recommendation of Mr. Pitt he took Francis with him as his secretary; and on his return to England in 1763, Francis received an appointment in the war office. Here he remained until March, 1772, when he resigned in consequence of a quarrel with Lord Barrington, the new minister at war. The remainder of that year he passed in travelling through Flanders, Germany, Italy, and France. In June, 1773, soon after his return, he was appointed one of the council of Bengal with a salary of £10,000. It has been supposed that he owed this lucrative place to the influence of Lord Barrington, now once more his friend; but the fact is not clearly established. Francis went to India in the summer of 1774, and remained there till Dec. 1780, when he resigned on account of his quarrel with Warren Hastings. This quarrel led to a duel, in which Francis was shot through the body. His active and somewhat austere disposition had brought him into constant opposition to Hastings, and for a time he controlled the majority in the council. Two of the members having died, Hastings obtained the mastery; and after their duel Francis returned to England in disappointment and anger. To revenge himself upon Hastings seems to have been the ruling motive of his later life. In 1784 he became member of parliament for Yarmouth in the isle of Wight. He was a bold, severe, and frequent speaker, but he never became distinguished as an orator. His politics were always extremely liberal. When the prosecution of Hastings began in 1786, its leaders would have committed the management to Francis. The house of commons, however, refused twice, by large majorities, to permit this appointment. Burke, Fox, and Windham labored in vain to change this determination. At last the committee of managers united in writing a note to Francis inviting him to aid them in their labors; he consented, and passed many years in this occupation. When others tired, Francis never flagged. He embittered the existence of his enemy, and no doubt destroyed his own peace in the effort. Hastings, however, finally triumphed and died acquitted. When the French revolution broke out, Francis was its firm friend. He became an active member of the revolutionary association of "Friends of the People." He was defeated at the election of 1796, when he stood for Tewkesbury, but in 1802 was returned by Lord Thanet for the borough of Appleby, and continued to sit for that borough while he remained in parliament. He sustained Fox and Grey in their plans of reform, and advocated the abolition of the slave trade with unfailing ardor. His political consistency is worthy of honor. In Oct. 1806, on the formation of the Grenville ministry, Francis was made a knight of the bath. It is believed that it was also designed to send him to India as governor-general, but this appointment never took place. He retired from parliament in 1807, and afterward wrote pamphlets and political articles in the newspapers. From the obscurity of old age he was suddenly recalled to the attention of the public. In 1816, John Taylor published his "Junius identified with a Distinguished Living Character," viz., Sir Philip Francis. The argument is ingenious, the coincidences remarkable; but none of Francis's acknowledged writings equal the fierce eloquence of Junius. He himself, it is said, always denied that he wrote the famous letters. He was the author of about 26 political pamphlets. He was twice married, the second time to a Miss Watkins, a clergyman's daughter, when he was over 70. By his first wife he left a son and two daughters.

FRANCIS of Assisi, a saint of the Roman Catholic church, and founder of the order of Franciscans, born in Assisi, in the present papal delegation of Perugia, in 1182, died near that city, Oct. 4, 1226. His father, Pietro Bernardone, was a wealthy merchant. The son was taught to speak the French tongue, and the ease with which he mastered it caused the change of his baptismal name of Giovanni to that of Francesco.

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He led a gay life until he was captured in a civil conflict of Assisi with Perugia, and kept for a year prisoner in the city of his enemies. During his detention he formed the design of renouncing the world; and fancying that he heard one day while praying in a church a voice from the crucifix, bidding him repair the falling walls of Christ's house, he gave the proceeds of some goods he had sold to the priest of the church, offering himself as an assistant. This act brought upon him the displeasure of his father, who threatened if he persisted to deprive him of his inheritance. But neither this threat, nor the popular ridicule which saluted his seeming insanity, could turn him from his purpose. He formally renounced his right of heirship, emptied his pockets, and even stripped himself of his clothing, putting on the cloak of a laborer. He was then (1206) 24 years old. From this time he gave himself exclusively to works of piety and charity. He begged in the streets for money to repair the church, and assisted the masons by carrying the stones with his own hands. He frequented the hospitals, washing the feet and kissing the ulcers of the lepers. Now he was stripped of his coarse raiment by robbers, and now he put it off from his own person to clothe the poor whom he met by the way. His excessive humility in dress and demeanor began after a time to win sympathy for him. Prominent men desired to imitate him, and to become his companions. The rich merchant, Bernard of Quintaval, in whose house Francis had been a guest, sold all his estate, distributed it to the poor, and came to pray with his friend. To him was soon joined a canon of the cathedral, Peter of Catana. These brethren received the dress of Francis, a coarse robe of serge girded with a cord, Aug. 16, 1209, from which day the foundation of the Franciscan order properly dates. At the beginning, Francis and his companions occupied a little cottage just outside the wall of the city; but as their number increased they removed to the premises of the Portiuncula, which had been offered them by the Benedictines, refusing, however, to accept this as a gift. His own habits were consistent with the strict poverty enjoined by his rule. He slept upon the ground, with a block of wood or stone for his pillow, ate his scanty food cold, with ashes strewed upon it, sewed his garments with packthread to make them coarser, bathed himself in snow to extinguish the fires of sensual desire, obeyed the orders of his novices, fasted long and rigidly, and shed tears so freely that he became nearly blind, and could only save his sight by a dangerous and painful searing of the face. He preached wherever he could find audience, yet he would never take priests' orders, and contented himself with the humble place of a deacon. He forbade, too, the spirit of controversy, and inculcated peace as the spirit which all Christians should labor to establish. In the civil strifes which raged so fiercely in Italy in the 18th century, he brought his order in as a peacemaker. Francis was a zealous missionary, and made long journeys in behalf of the Catholic faith. He sought to visit Morocco, and was only prevented by a sickness which detained him in Spain. His cherished design was to lay down his life in the Holy Land in behalf of Christ's religion. His first attempt to reach Syria proved ineffectual; contrary winds hindered his vessel. But the plan was not relinquished, and after a brief sojourn in Acre, he joined the camp of the crusaders at Damietta in 1219. He arrived only to witness the failure of the Christian army, but he was gratified in his desire for an interview with the Saracen chief, and was permitted to testify in presence of the infidels concerning Christ and the Christian faith. On the occasion of the formal approbation of his order in 1223, he preached a sermon before the sacred college, which seems to have been the last of his important public performances. His failing health and growing blindness confined him more and more to that favorite seclusion of the hill of Alverno, on which a nobleman had built a church and convent for the Franciscan brethren. In this solitude he gave himself more ardently to prayer and religious exercises. His enthusiasm became rapture. His visions were multiplied. The Saviour and the saints seemed to appear, and the legend tells of the *stigmata*, the print of nails in the hands and feet, and of a wound in the side, corresponding to similar marks on the person of the Saviour, which Francis brought away with him from one of these interviews. It was even affirmed that blood continued to flow from his wounds; and portions of this blood were long after exhibited for the reverence of the faithful. He was canonized July 16, 1228.—The literary remains of St. Francis are neither numerous nor especially remarkable. They consist of letters, monastic conferences, parables, and poems in the Italian tongue. The best edition is that of 1641 (folio, Paris). The life of the saint has been many times written by brethren of the various branches into which his order has been subdivided; by Thomas de Celano, his disciple; by St. Bonaventura; by Helyot; by Chalippe (4to., 1728, and 2 vols. 12mo., 1736); by Chavin (8vo., Paris, 1841); by Böhringer in his series of biographies; and by Frederic Morin (16mo., Paris, 1853).

FRANCIS OF PAULA, the founder of the order of Minims, a saint of the Roman Catholic church, born in Paula, Calabria, in 1416, died in Plessis-les-Tours, April 2, 1507. He was devoted by his parents to St. Francis of Assisi, to whose intercession they ascribed his birth, after their marriage had been for a long time childless. When 12 years old he was brought into an unreformed convent of Franciscans in Calabria, where he surpassed all the monks in the strict observance of the rule. Two years later, in 1428, he returned to Paula, resigned his right of inheritance, and retired to a grotto to lead the life of a hermit. He was hardly 20 years old when he found many followers, who built themselves cells near his grotto. He received from

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the archbishop of Cosenza the permission to build a church and convent, which were completed in 1436. From this year dates the establishment of the order of the Minims, which adopted the name of hermits of St. Francis. To the usual 3 monastic vows (poverty, chastity, obedience) St. Francis added as a fourth, perpetual abstinence, not only from meat, but also from eggs and milk, except in cases of sickness. He himself was still more ascetic. He slept on the bare ground, took no food before sunset, often contented himself with bread and water, and sometimes ate only every other day. The fame of miracles reported of him induced Pope Paul II. in 1469 to send to him his chamberlain in order to investigate the facts. The report made to the pope was very favorable to the saint and his new order. Pope Sixtus IV. confirmed this order, appointed the founder superior-general, and permitted him to establish as many convents as he could. King Louis XI. of France called him to his court, in order to cure him of a dangerous sickness, but Francis waited until, in 1482, the pope ordered him to go. He met the sick king in Tours, and exhorted him to leave the issue of his sickness to the will of God, and to prepare himself for death. The successor of Louis, Charles VIII., retained the saint in France, and consulted him in cases of conscience as well as in state affairs, and built for him 3 convents, two in France and one in Rome. Francis was canonized by Leo X. in 1519.

FRANCIS DE SALES, a saint and bishop of the Roman Catholic church, born at the chateau de Sales, near Annecy, Savoy, Aug. 21, 1567, died in Lyons, Dec. 28, 1622. Both his parents were noble by birth. Francis, their eldest son, was sent successively to the college of Annecy, to the Jesuits' school in Paris, and to Padua, where he studied law. At the age of 20 he received the degree of doctor of laws. His inclination, nevertheless, was toward the ecclesiastical life. He refused repeatedly the offered dignity of senator, and finally obtained his father's permission to accept the place of provost in the cathedral at Geneva. His ordination as deacon soon followed, and in 1591, at the age of 24, he began his work as a preacher. His success was immediate and wonderful. His earnest manner, and the spiritual elevation and beauty of his thought, gave him a powerful hold on his audiences. He went on foot through the neighboring villages, visited the prisons, and became everywhere known as the friend of the sick and the poor. Accompanied by his cousin, Louis de Sales, he went on a mission among the Protestants of the province of Chablais. All sorts of difficulties were thrown in his way. There were conspiracies against his life, and slanders against his character. At first the converts were few. Some of the soldiers were moved, and a partial reform in their manners was accomplished; but nearly 4 years passed by without any considerable impression upon the heresy. At last, however, conversions multiplied; new missionaries came to his aid, and in 1598 the Catholic religion was publicly restored and the reformed faith was suppressed throughout the province. Repeated conferences were held with distinguished Protestant leaders, and the brilliant success of Francis in the argument with La Faye led the pope to select him to deal with Theodore Beza; but in this case he was not able to report a conversion. In 1599 he was chosen coadjutor to the bishop of Geneva, whose death in 1602 left to Francis the full charge of the diocese. His episcopal life was characterized by the same zeal, vigor, and devotion which had marked his missionary career. He went first to Paris, where he preached before Henry IV. in the chapel of the Louvre, and liberal offers of money and place were made to retain him in France. But he preferred to return, and after assisting the cardinal de Bérulle in the establishment of the Carmelite order and the congregation of the Oratory, he went back to Switzerland. He established new and stricter rules, not only for the clergy and laity of his diocese, but for his own personal conduct. He renounced all luxuries, multiplied fasts, discouraged lawsuits, and reformed the lax discipline of the monasteries. His fame as a preacher led various cities to solicit his aid in the services of the Lenten season. He was more than once chosen, from his moderate and peaceful temper, to reconcile disputes between different parties and orders in the church. A still wider renown was given to his name by the publication (in 1608) of the "Introduction to a Devout Life." The purpose of this book, originally composed of letters to a lady, was to show that the secular state is not incompatible with a truly religious life. Some ridiculed it, others denounced it, as allowing profane pleasures in the sacred state. On one occasion it was torn by a preacher, and burned before the eyes of the congregation. But generally the book and its doctrines were approved, and even the Protestant James of England, who had received a jewelled copy as a present from the queen of France, graciously commended it to the clergy of his realm. It was translated into many tongues, and in less than 50 years 40 editions of it were published. Francis was far from undervaluing monastic institutions. He not only established convents of existing orders, but he founded a new order of nuns (1610), called the order of the Visitation, and induced the wealthy and accomplished Madame de Chantal to come from France and preside over it. In 1616 he published his work on the "Love of God," a fit sequel to the former "Introduction." The appointment of a younger brother as assistant bishop enabled him to give himself more fully to the work of reclaiming heretics. The famous Calvinistic leader Lesdiguières became one of his converts. In 1619 he visited Paris as one of the embassy sent to secure the hand of the princess Christina for the young prince of Piedmont. His preaching in this visit

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revived the impression which it had made in the previous reign. On his return to his own diocese he applied himself more resolutely than ever to the ministration of alms, the suppression of scandals, and exercises of personal discipline. In 1622 he accompanied Louis XIII. of France from Avignon to Lyons, where, on Christmas day, after preaching, he was attacked with apoplexy, and died on the third day after. The works of St. Francis have been often published. The best edition is that of 1835, 16 vols. 8vo., Paris. A complete edition, to comprise 15 vols., is in progress 6 vols. having been published up to 1858.

FRANCISCANS (*Minorites, Fratres Minores*), a religious order in the Roman Catholic church, founded by St. Francis of Assisi in 1209 at the small church called Portiuncula near Assisi. When the number of his disciples had increased to 10, he gave them, in 1210, a rule, in which strict poverty and a union of the active and contemplative life are the principal points. The order was orally confirmed by Innocent III. in 1210, and again in 1215, and spread with such extraordinary rapidity that 5,000 brethren were assembled at the general chapter in 1219. In 1223 Honorius III. confirmed the order, by a bull, as the first among the mendicant orders, gave them the right of collecting alms, confirmed to the church of Portiuncula the celebrated indulgence which was afterward extended to all the churches of the Franciscans, and granted them several other privileges. The vow of poverty made the Franciscans the favorites of all classes of the people, and thus secured them more novices than any of the other orders. Forty-two years after the death of the founder the number of Franciscans was estimated at about 200,000, with 8,000 convents in 23 provinces. At the head of the convent a guardian was placed; the guardians of a province chose a provincial, who was assisted by *definitores;* the general assembly of all the provincials (general chapter) elected a general, and likewise definitores. The simplicity of the rule left room for the greatest variety of opinions. This showed itself during the lifetime of the founder, one party wishing to have the vow of poverty mitigated, the other strenuously opposing any such change. From 1219, when Elias of Cortona, the first leader of the milder party, was made by St. Francis himself vicar-general of the order, until 1517, when Leo X. divided them into two separate organizations, the strife never ceased. At the election of almost every new general we find the two parties in competition, and even the popes sometimes siding with the one, sometimes with the other. The milder party, when in a minority, generally submitted; but the rigorous party, when prevented from upholding the whole rule of St. Francis, preferred to form separate branches. In several cases they even dared to oppose the pope when he decided against them, and to appeal from him to a general council. As early as 1236, when Elias of Cortona, after having been once expelled from the order, was reëlected general, Cæsarius of Spire left the order, followed by 72 others, called after him the Cæsarines or Cæsarians, who, however, were reconciled with their brethren when in 1256 Bonaventura as general restored a stricter observance of the rule. The lax government of the general Matteo di Aquas Spartas caused in 1294 the foundation of the Minorite Celestines; who however, after the death of their protector Celestine V., were, in 1307, condemned by the inquisition as heretics and suppressed. Some of them who fled to France established in 1308 the Minorites of Narbonne and the Spirituals, who were likewise condemned in 1318 as infected with the heresy of Peter John Oliva. Another offshoot of Celestines, the Minorite Clarenines, founded in 1302 by Angelo di Cordona, was tolerated, and existed until 1506, when they united with the Observants. Much more successful than these secessions was the attempt of Paoletto di Foligno in 1368 to restore the strict observance of the rule. His followers were called Observants, and those who adhered to the milder rule Conventuals. Henceforth these two names distinguish the two great parties. By the 15th century the number of new congregations had thrown the order into great confusion. Leo X. made an attempt in 1517 to reunite them, but succeeded only with the various congregations of Observants, on whom he therefore conferred the right of electing the general (*minister generalis*), while the Conventuals could only elect a magister-general (*magister generalis*), whose election had to be confirmed by the general. From that time the quarrels between the Observants and Conventuals were less violent. The Conventuals made several attempts to regain the ascendency, but in 1631 Urban VIII. commanded them to abandon their claims for ever. Notwithstanding the desire of the pope that no further separations should occur, several congregations arose, mostly for the purpose of still surpassing the strict observance of the Observants. These communities were styled Minorites of the stricter observance, and though forming separate provinces from the main body of the regular Observants, were always under the same general. They were called Alcantarines in Spain from St. Peter of Alcantara, Riformati in Italy and Germany, and Recollects in France, England, Ireland, Belgium, and Holland. The Capuchins, originally a congregation of reformed Franciscans, became afterward an independent order. (See Capuchins.) The number of the Franciscans has been greatly reduced by political revolutions since 1789. In the 18th century the Franciscans, including the Capuchins, still counted nearly 200,000 members with about 26,000 convents; in 1843, the number of the Observants, the most numerous branch, was estimated at about 80,000. Since 1848 their number has again begun to increase. They are found in every part of Europe. In Asia they have a province in Palestine, whose mem-

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bers are the guardians of the holy sepulchre and other Christian sanctuaries, and are celebrated for their hospitality to pilgrims and travellers. In China they have charge of two apostolic vicariats. The Franciscans were the earliest missionaries to America, having come over with Columbus on his second voyage in 1493. Their first formal establishment in the new world was in 1502, when 12 friars, with a prelate named Antonio de Espinal, accompanied Ovando to San Domingo. They went to Florida with Pamphilo de Narvaez in 1528, one of their number, Juan Juarez, bearing the rank of bishop; but of this band of missionaries we know little. They seem to have effected no establishment, and all perished miserably. An Italian Franciscan, Mark of Nice, penetrated into New Mexico and California in 1539, and gave the name San Francisco to the country which he visited. The exaggerated reports of what he had seen and heard led adventurers to those regions, and with them came a number of Franciscans, some of whom remained behind after the return of the expeditionists and were martyred. Father Andres de Olmos founded a successful mission in Texas in 1544. Subsequently priests of this order established themselves permanently in Florida, California, Mexico, and other parts of the South and West, and were among the first to plant Christianity in Canada, and in what are now the northern and north-eastern states of the Union. Their labors in Canada date from 1615, when 4 Recollects (3 priests and one lay brother), came over from France and took charge of the Huron, Algonquin, and Montagnais missions, which they and their brethren conducted alone, until the Jesuits came to aid them in 1625. The Recollects figured largely in the missionary history of Canada for many years. The celebrated explorer Hennepin was a Franciscan missionary. The foundations of the order in California, notwithstanding the numbers who were put to death by the Indians, still remain, and have recently been reënforced by accessions from Europe. They are numerous in all parts of Central and South America. Their present houses in the United States, except those in California, have been founded very recently, chiefly by Italians and Germans. They have a convent and college at Alleghany, Cattaraugus co., N. Y., which now (1859) numbers 12 members, and is intended as the nucleus of a large establishment; and there are houses of the order at Teutopolis, Ill. (3 members in 1858), and Cincinnati (4 members). All these are Observants. The Conventuals have convents in Italy, Austria, Bavaria, Switzerland, Malta, Poland, Turkey, and since 1858 in the United States. We find Franciscans soon after the death of St. Francis as professors of theology at the university of Paris, which in 1244 was commanded by Pope Innocent IV. to admit Franciscans and Dominicans to academical dignities. In union with the Dominicans they strove for several centuries to extend in the theological schools the influence of the monastic orders at the expense of the secular clergy. With the Dominicans they maintained various philosophical and theological controversies, which are partly still kept up as an ancient inheritance of both orders, the Franciscans being realists, anti-Augustinians, and defenders of the immaculate conception, while the Dominicans are nominalists and Augustinians, and were formerly opponents of the immaculate conception. Among the celebrated men produced by the order are Anthony of Padua, Bonaventura, Alexander of Hales, Duns Scotus, Roger Bacon, Nicolaus de Myra, Occam, Cardinal Ximenes, and the popes Nicholas IV., Alexander V., Sixtus IV., Sixtus V., and Clement XIV. In the first period of their history they had a considerable number of mystical writers and composers of hymns, as Thomas de Celano, the author of *Dies Iræ*, and Giacopone da Todi, the author of the *Stabat Mater*.—St. Francis also established an order of nuns, who are generally called, from its first abbess Clara of Assisi, Poor Clares or Clarisses. Another branch were the Tertiarians or penitents of the third order of St. Francis, who remained in the world, but followed a rule and discipline similar to those of the first and second orders. They received their rule from St. Francis in 1221. This order includes a great many kings and queens (as Louis IX. of France, and the mother and wife of Louis XIV.) and popes among its members, Pius IX. being one. The Tertiarians afterward began to live in community and take vows, but this practice was in time abandoned. New communities of Tertiarians subsequently sprang up, devoted to teaching, and became independent of the parent order. They have houses in Pennsylvania, Indiana, Michigan, Wisconsin, and Brooklyn, N. Y. Among the communities of women, the Elizabethines, founded in 1395 by Angelina di Corbaro, are the most important. In France they were also called daughters of charity. In 1843 they had about 1,000 members. In the United States there are establishments of sisters of the third order of St. Francis in the dioceses of Vincennes, Milwaukee, Cincinnati, and Sault Ste. Marie.—The habit of the Observants consists of a cowl with a pointed capoche, a cord as a girdle, and sandals. Its color differs in different localities. In England and Ireland it is gray, whence the name "gray friars." Some congregations let the beard grow. The Conventuals generally wear a black cowl and capoche. They also wear shoes, and are always without beards.—The principal work on the Franciscans is the *Annales Fratrum Minorum* (2d ed., 16 vols., Rome, 1731), by the Irish Franciscan Lucas Wadding (died in 1657). The author himself carried the history of his order to the year 1540; De Luca continued it to 1553 (vol. xviii., Rome, 1740). His work was then interrupted, until a few years ago it was taken up again by order of the general, and 2 new volumes were published at Rome.

FRANCKE, August Hermann, a German preacher, and founder of the orphan house at Halle, born in Lübeck, March 23, 1663, died

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June 8, 1727. He studied at the universities of Erfurt, Kiel, Gotha, and Leipsic, and founded in Leipsic a school for the interpretation of the Scriptures, which attracted a great number of students. Accused of pietism, he was obliged to renounce this employment in 1691, and passed to Halle, where he taught the Greek and oriental languages in the university. Here he founded a charitable institution for the education of poor children and orphans, which soon became one of the most considerable in Germany. A chemist, whom he had visited on his death-bed, bequeathed to him the recipe for compounding certain medicines which afterward yielded an annual income of more than $20,000, and made the institution independent. It combined an orphan asylum, a pædagogium, a Latin school, a German school, and a printing press for issuing cheap copies of the Bible.

FRANCOLIN, a gallinaceous bird of the grouse family, sub-family *perdicinæ* or partridges, and genus *francolinus* (Steph.). There are about 30 species found in the warm parts of the eastern hemisphere, especially in Africa; some prefer open plains, where they roost in trees, and others woody places; when alarmed, they conceal themselves in the brushwood, or run with considerable speed, taking wing only when hard pressed; their food consists of bulbous roots, grains and insects, and they feed in early morning and at evening. The bill is longer than in the common partridge; the wings are moderate and rounded, the 3d, 4th, and 5th quills the longest; the tarsi are strong and spurred; the feet 4-toed. The francolin of Europe (*F. vulgaris*, Steph.), in the male, has the plumage of a general yellowish brown color, each feather with a dark centre; the ear coverts white; circle round the eyes, cheeks, and sides of head, and the throat, deep black, below which is a broad chestnut collar extending around the neck; the rump and tail white barred with black, the outer feather of the latter entirely black; breast and lower parts black; sides blotched with black and white; under tail coverts chestnut; bill black. The female is without the black markings and chestnut collar, and her bill is brown. This is the only species indigenous in Europe, where it is found in the southern parts; it also occurs in northern Africa and the greater part of Asia. The flesh is delicate, and much esteemed in India. According to Gould, this genus seems to form a connecting link between the brilliant pheasants and tragopans of the East and the sober-colored partridges of Europe; to the splendid colors of the former it unites the form and habits of the latter.

FRANCONI, Antoine, an equestrian artist, born in Venice in 1738, died in Paris, Dec. 6, 1836. At first a mountebank and perambulating physician, he afterward gave bull fights at Lyons and Bordeaux, and associated himself in 1783 with Mr. Astley, who was the proprietor of a circus in Paris. He became subsequently celebrated as the founder of the *cirque olympique* in Paris, which was opened in Dec. 1807. As he had become blind, the establishment was conducted by his sons Laurent and Minette. In 1833 they all withdrew from the arena excepting their adopted brother Adolphe. The elder Franconi recovered his sight in the latter part of his life. At his request his funeral was attended by his favorite horse.

FRANCONIA (Ger. *Franken*, or *Franken-Land*, land of the Franks), an old duchy and afterward a circle of the German empire. In the 5th century it formed the central part of Thuringia, and on the dismemberment of that kingdom fell to the Franks, under whom it had several names. That of Franconia was given about the 10th century, when it constituted the E. part of the Frankish territories, and was governed by dukes who for some years were independent. In 1512 Maximilian I. erected a part of it into a circle of the empire, containing the towns of Nuremberg, Schweinfurt, Rothenburg, Weissenburg, and Windsheim. Between 1801 and 1819 it was partitioned among Würtemberg, Baden, Hesse-Cassel, Saxony, and Bavaria, the last named state receiving the largest portion, and still retaining the name in the 3 circles of Upper, Middle, and Lower Franconia.—Upper Franconia (Ger. *Oberfranken*) nearly corresponds with the former circle of Upper Main, and lies in the N. E. part of the kingdom, bordering on Saxony; area, 2,226 sq. m.; pop. in 1855, 493,913. It is a mountain region, occupied in the N. E. by a portion of the Fichtelgebirge, and rich in gypsum, marble, gold, silver, lead, and iron. Agriculture and cattle raising are carried on with success. Capital, Baireuth.—Middle Franconia (Ger. *Mittel-Franken*) comprises that portion of territory anciently known as the circle of Rezat, and includes the former margraviate of Anspach, the free city of Nuremberg, the bishopric of Eichstadt, and part of Baireuth; area, 2,798 sq. m.; pop. in 1855, 533,587. It touches Würtemberg on the W. It is intersected by branches of the Franconian Jura, and a small portion of the mountainous district is too rough for tillage, but ¼ of the circle is in a high state of cultivation, producing the grape, tobacco, pasturage, and hops. There are few minerals, but important manufactures are carried on in most of the towns. Capital, Nuremberg.—Lower Franconia (Ger. *Unter-Franken*), nearly identical with the former circle of Lower Main, comprises the old bishoprics of Würzburg and Fulda, with several smaller territories; area, 3,604 sq. m.; pop. in 1855, 589,076. It is bounded N. by the Saxe duchies, S. by Würtemberg and Baden, W. by Darmstadt, and N. W. by Hesse-Cassel. Its N. part is traversed by the Rhöngebirge, and its S. W. by the Spessart mountains. There are several extensive forests, but the plains and river bottoms are well cultivated, producing grain, potatoes, hops, and the grape. Capital, Würzburg.

FRANCONIA, a post township of Grafton co., N. H., 75 m. N. of Concord; pop. in 1850, 584. It is situated in the midst of the magnificent scenery of the White mountains, and con-

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tains the celebrated natural curiosity called the "old man of the mountain." This consists of 5 immense granite blocks, altogether 80 feet long, on an overhanging cliff of Profile or Jackson mountain, so disposed that, as seen from the road 1,000 feet below, they closely resemble the outline of a human face. Beneath it lies a small pond sometimes called the "old man's wash-bowl." Between Profile mountain and Mt. Lafayette is Franconia Notch, in which is Echo lake, where the human voice is several times distinctly reverberated from side to side. The S. branch of the Ammonoosuck river passes through the township, supplying several extensive iron works with water power. A rich vein is worked about 3 miles from the furnace, the ore from which yields between 50 and 63 per cent. Franconia is reputed to be in winter the coldest place in the United States, the temperature sometimes falling to 49° F. below zero, while in summer it reaches 100° above.

FRANKEL, Zacharias, a German Hebrew theologian and archæologist, born in Prague in 1801, studied at Pesth, officiated as rabbi in Töplitz, and subseqnently in Dresden, and in 1855 became the director of the Jewish theological seminary of Breslau. He is one of the most esteemed representatives of the moderate progressives in modern Jewish theology, and his critical writings are valuable.

FRANKFORT, a city of Franklin co., Ky., capital of the county and state, situated on the N. E. (right) bank of Kentucky river, 62 m. above its mouth in the Ohio, and 24 m. N. W. from Lexington; lat. 38° 14' N., long. 84° 40' W.; pop. in 1850, 3,308; in 1855, abont 5,000. It is built on a high plain lying between the river and a bluff 150 or 200 feet high, and is regularly laid out, with neat-looking houses. The principal edifices are the state house, 86 feet long by 54 wide, built of Kentucky marble, and having a handsome Ionic portico, the state penitentiary, court house, and gaol. On one of the hills which overlook the city is a cemetery, in which are buried several of the gov ernors and other state officers, and also the remains of Daniel Boone, the pioneer in the settlement of Kentucky. The city has a branch of the bank of Kentucky, with a capital of $350,000, and in 1850 contained 4 churches, an academy, and 7 newspaper offices. It is supplied with excellent water conveyed through iron pipes from a spring 2 m. distant. Both the trade and the manufactures are important. The Louisville and Lexington railroad passes through the city, and the Kentucky river is navigable thns far by large steamboats, while by means of dams and locks it has been improved so that small craft can ascend to its head branches. In this part of its course it flows through a limestone valley. Its banks here are generally high, and its width opposite Frankfort is about 250 feet. A chain bridge connects the city with the village of South Frankfort on the S. W. bank. The surrounding country is remarkable for its picturesque scenery.

FRANKFORT-ON-THE-MAIN (Ger. *Frankfurt am Main*), one of the free cities of Germany, the seat of the German diet, the birthplace of Goethe, and celebrated for its historical associations, is situated in a fertile valley on the right bank of the river Main, 20 m. above its confluence with the Rhine, near the Taunus mountains; distance by rail from Mentz 21 m., from Heidelberg 54 m., from Basel 224 m., and from Munich 325 m. The territory of Frankfort comprises, beside the city, 9 villages; area, abont 90 sq. m.; pop. in 1856, 74,784, and of the city alone 64,287, inclusive of 944 Frankfort soldiers, but exclusive of 4,000 Austrian, Prussian, and Bavarian troops. The finest street of the ancient city is the Zeil, united in 1856 with the Neue Krämе, and also through the new Liebfrauenstrasse with one of the principal squares, the Liebfrauenberg. The other remarkable public squares are the Rossmarkt, with a monument in honor of the art of printing inaugurated in 1857, the Goethe square, with Schwanthaler's statne of Goethe, and the Römerberg. In the latter is the Römer, or council house, where the German emperors were elected and entertained in the Kaisersaal, the walls of which are covered with portraits of the emperors. The golden bull of Charles IV. which regulated the election of the emperors is preserved in the building. The Judenstrasse of Frankfort contains the houses in which Börne and the founder of the house of Rothschild and his children were born. The Neue Juden or Bornheimerstrasse forms a continuation of the Judenstrasse. The counting house of Rothschild is sitnated npon this street. The streets which command most traffic are the Fahrgasse and Schnurgasse; during the great annual fairs of Easter and Michaelmas they are crowded with strangers and traders. Frankfort possesses more beautiful promenades than perhaps any other city in the world; delightful villages, as Bockenheim, Bornheim, Oberrad, &c., are within a short distance of the city, as well as several famous watering places, such as Homburg and Soden; and Wiesbaden is within an hour's distance by railway. There are several private and public picture galleries. The Städel museum, so called after its founder, who bequeathed to it $400,000 beside valnable art collections, contains a library and a school of art. Bethmann's garden contains Dannecker's "Ariadne" and his colossal bust of Schiller. In the public library are about 70,000 volnmes and many important MSS. The museum of the Senkenberg society of naturalists contains among its principal collections that of Dr. Rüppel, the Abyssinian traveller. Beside a gymnasium, there are about 25 public and many private schools. The city is divided into 90 alms districts for the relief of the poor, and there are over 30 charitable institutions and hospitals. There are 3 Catholic, 6 Lutheran, and 2 Reformed churches, and 4 Lutheran chapels. The principal of them is the cathedral or church of St. Bartholomew, a Gothic struc-

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ture, the tower of which is still unfinished. The most celebrated Lutheran church is that of St. Paul (formerly *Barfüsserkirche*), where the German parliament was held in 1848 and 1849. A new synagogue for the orthodox Jews was opened in 1856, and one for the rationalistic Jews in 1858. The theatre of Frankfort was enlarged and embellished in 1855, and is among the best in Germany. The new post office on the Zeil is a stately building, as well as the new exchange. The principal business of Frankfort is banking. There are about 20 first-class banking houses, foremost among which are those of Rothschild, Bethmann, Grunelius, Metzler, Gontard, and Heyder. The number of houses, chiefly Jewish, engaged in the stock and exchange business amounts to at least 200. The magnitude of this business is due partly to the great wealth of the city, and partly to its geographical situation, which makes it a convenient medium of exchange between Vienna and Paris, Trieste and Hamburg, and Vienna and Berlin. A new bank with a capital of $4,500,000 was established in 1854. The chief local manufactures are carpets, table covers, jewelry, playing cards, oilcloth, tobacco, snuff, and Frankfort black. A chamber of industry was established in 1855. The suburb of Sachsenhausen, on the left bank of the Main, and united to Frankfort by a fine stone bridge, is an important market for fruits and vegetables. Leipsic has taken from Frankfort the supremacy which it once possessed in the book trade, but there are 30 booksellers in the city, and several important publishing and engraving establishments. There are about 20 daily and periodical publications; the principal political daily journals are the *Frankfurter Journal*, the *Postzeitung*, and the *Journal de Francfort*. The government is republican, and vested in two burgomasters, who are annually elected by the senate, a senate, a legislative assembly, and a permanent committee of citizens. The burgomasters preside over the senate. According to the new law of 1856, that body is composed of 21 members elected for life, 4 of whom are chosen from the ranks of accomplished lawyers (*Syndiken*), and 4 from those of mechanics. The legislative assembly, which has 88 members in all, is composed of 57 members (including 4 Jews) chosen from the citizens, 20 members from the permanent committee of citizens, and 11 deputies from the rural districts. The revenue of 1858 was estimated at $900,000, the expenditures at $850,000, and the public debt at $3,350,000, beside a debt of $280,000 contracted for the construction of railways. Frankfort and the free cities of Hamburg, Lübeck, and Bremen occupy the 17th place in the Germanic confederation, and have one vote in the smaller council of 17. Frankfort has a separate vote in the general assembly (*Plenum*), and furnishes a contingent of 1,044 men to the federal army. The German diet has been held since 1851 in the palace of Prince Thurn and Taxis, which in 1848 and 1849 was also the seat of the cabinet of the vicar of Germany.—Frankfort is mentioned in 794, under the name of *Palatium Franconenford*, as the place selected by Charlemagne for the seat of an imperial convention and religious council. The election and coronation of the German emperors there subsequently gave great importance to the city. Under Napoleon I. it became the capital, first of a principality, and then of a grand duchy, with an area of about 2,000 sq. m., and a population of 300,000. Since 1814 it has recovered its independence, and since 1816 it has been the seat of the German diet. On April 3, 1833, the city was the theatre of a political outbreak for which many students were arrested. In 1848 and 1849 it derived political importance from the German parliament held there. A riot broke out during the excitement about the Schleswig-Holstein war (Sept. 18, 1848), in which the Prussian major-general Auerswald and Prince Felix Lichnowsky were killed by the mob.

FRANKFORT-ON-THE-ODER, a Prussian city, capital of an extensive circle of the same name in the province of Brandenburg, on the left bank of the river Oder, 49½ m. by rail from Berlin, and 170 m. from Breslau; pop. of the circle about 900,000, and of the city in 1855, 30,938. The prosperity of the town is due to its situation on the railway between Berlin and Silesia, to its navigable river, which is connected by canals with the Vistula and the Elbe, and to its 3 annual fairs, at which large quantities of cotton, woollen, silk, and other goods are sold, though to a less extent than formerly. The city has 3 suburbs, fine streets, public squares and gardens, a theatre, many charitable institutions, a Roman Catholic church, a synagogue, and 6 Protestant churches. The university was removed to Breslau in 1810; a gymnasium still remains, beside which there are 10 schools. Beyond the wooden bridge which connects the old town on the left bank of the Oder with the suburb on the right bank is a monument to Prince Leopold of Brunswick, who was drowned here in 1785, while attempting to rescue a family during an inundation. The battle of Kunersdorf was fought within 3 m. of the town in 1759, and there is in Frankfort a monument of the poet Kleist, who died from a wound received in this battle.

FRANKINCENSE, the fragrant gum resin, known in medicine as *olibanum*, the product of the tree *Boswellia serrata*, which grows among the mountains of central India and upon the Coromandel coast. It is imported from Calcutta in the form of roundish lumps or tears, which have a pale yellow color, are somewhat translucent, and are covered with a whitish powder produced by friction. It has an agreeable balsamic odor, but its taste is acid and bitter. Like the common balsam gum, it softens when chewed, adheres to the teeth, and whitens the saliva. It readily inflames, and imparts in burning a fragrant odor. This is the property which rendered it so highly esteemed with the

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ancients, by whom it was introduced as one of the ingredients in their incense, which was burned (*incensum*), according to Maimonides, to conceal the smell arising from the slaughtered animals of the sacrifices. According to others, the smoke of its burning was regarded as in itself an acceptable offering, because it was symbolical of prayer and of interior worship (Ps. cxli. 2; Rev. viii. 3, 4). Olibanum is but imperfectly soluble in water. Alcohol takes up about ¼ of it, forming a transparent solution. Braconnot obtained 8 parts of volatile oil, 56 of resin, 30 of gum, and 5.2 of insoluble glutinous matter; loss 0.8. The article finds but little use in medicine except for fumigations, and rarely as an ingredient of plasters.—Another variety of frankincense is obtained from Arabia and the N. E. portion of Africa. The tree which produces it has not been described; it does not appear, however, to be the same species, if of the same genus, as that from which the Indian olibanum is obtained.

FRANKLIN, the name of counties in many of the United States. I. A W. co. of Me., bordering on Canada East, and drained by Dead and Sandy rivers, branches of the Kennebec; area, 1,600 sq. m.; pop. in 1850, 20,027. It has no navigable streams, but there are several mill creeks and small ponds. The surface is undulating, with a few mountainous elevations, the chief of which are Mt. Blue, Mt. Abraham, and Saddleback mountain. The soil is adapted to grain, potatoes, and pasturage. The productions in 1850 were 47,860 bushels of wheat, 210,942 of potatoes, 84,879 of Indian corn, 120,064 of oats, 49,717 tons of hay, 540,720 lbs. of butter, and 163,609 of wool. There were 15 grist mills, 25 saw and planing mills, 6 flour mills, 5 starch factories, 9 tanneries, 1 woollen factory, 36 churches, 1 newspaper office, and 6,789 pupils attending public schools. Formed in 1830 out of portions of Oxford and Somerset counties. Capital, Farmington. II. A N. W. co. of Vt., bordering on Canada East and Lake Champlain, and drained by Missisque and Lamoille rivers; area, 630 sq. m.; pop. in 1850, 28,586. The surface is irregular, the soil fertile, and the chief productions are marble, iron, oats, potatoes, wool, and hay. In 1850 it yielded 258,757 bushels of potatoes, 55,488 of wheat, 145,840 of oats, 78,619 tons of hay, 1,399,445 lbs. of butter, 1,196,660 of cheese, and 209,350 of wool. There were 3 flour and grist mills, 4 woollen factories, 2 iron founderies, 15 tanneries, 47 churches, 2 newspaper offices, and 7,537 pupils attending public schools. The commerce of the county is carried on through Lake Champlain, which is navigable here for vessels of 90 tons, and over the Vermont central railroad. Organized in 1792. Capital, St. Albans. III. A N. W. co. of Mass., bordering on Vermont and New Hampshire, intersected by the Connecticut and drained by Miller's and Deerfield rivers; area, about 650 sq. m.; pop. in 1855, 31,652. The surface is hilly and in some places mountainous, the soil is good, and the staples are Indian corn, potatoes, and hay. In 1855 the productions were 253,616 bushels of Indian corn, 247,217 of potatoes, 49,349 tons of hay, and 884,307 lbs. of butter. There were 6 cotton and 5 woollen factories, 2 iron founderies, 26 tanneries, 3 factories of cutlery, 1 of edge tools, and 8 of agricultural implements. In 1858 it contained 94 churches and 2 newspaper offices. The principal channels of transportation are the Connecticut river railroad, and the Vermont and Massachusetts railroad. The Connecticut river has been made navigable here for boats. Formed from Hampshire co. in 1811. Capital, Greenfield. IV. A N. E. co. of N. Y., bordering on Canada East, drained by Saranac, Chateaugay, Salmon, St. Regis, and Racket rivers; area, 1,764 sq. m.; pop. in 1855, 25,477. The St. Lawrence touches its N. W. corner. It has an uneven surface, diversified by a great number of small lakes. The S. E. portion is occupied by the Adirondac mountains, the highest peak of which in this co. is Mt. Seward, 5,100 feet above tide. Bog iron is found in considerable quantities. The soil is adapted to grain and pasturage, and much of it consists of rich sandy loam. The productions in 1855 were 37,594 tons of hay, 70,913 bushels of wheat, 144,617 of oats, 83,615 of Indian corn, 484,425 of potatoes, and 1,050,040 lbs. of butter. There were 11 grist, 85 saw, 1 oil, 1 carding, and 2 wool mills, 17 manufactories of starch, 1 of soap, 1 of saleratus, 2 of agricultural implements, 8 of coaches and wagons, 5 of cabinet ware, 2 of woollen goods, 1 machine shop, 1 furnace, 1 brick yard, 6 tanneries, 2 newspaper offices, 167 school houses, and 35 churches. A railroad from Ogdensburg to Rouse's Point passes through the county. Formed from Clinton co. in 1808. Capital, Malone. V. A S. co. of Penn., bordering on Maryland, bounded E. by South mountain, N. W. by Tuscarora or Cove mountain, and drained by several creeks; area, 740 sq. m.; pop. in 1850, 39,904. Most of it consists of a rich limestone valley, well watered, and abounding in slate, marble, and iron. In the N. part rises Parnell's Knob, a lofty peak forming the S. W. termination of the Kittatinny range. The productions in 1850 were 837,062 bushels of wheat (the greatest quantity produced by any county of the state except Lancaster), 539,976 of Indian corn, 393,447 of oats, 33,591 tons of hay, 67,466 lbs. of butter, and 44,192 of wool. There were 85 flour and grist mills, 30 saw mills, 6 founderies, 6 forges, 5 furnaces, 10 woollen factories, 37 tanneries, 17 distilleries, 7 newspaper offices, 78 churches, and 8,579 pupils attending public schools. The county is traversed by the Cumberland valley railroad. Capital, Chambersburg. VI. A S. co. of Va., bounded N. E. by Staunton river, N. W. by the Blue Ridge; area, 864 sq. m.; pop. in 1850, 17,430, of whom 5,726 were slaves. The surface is undulating or moderately uneven; the principal mineral is iron, the soil is fertile, and the productions in 1850 were 76,831 bushels of wheat, 431,408 of Indian

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corn, 187,792 of oats, 1,125,404 lbs. of tobacco, and 13,952 of wool. There were 14 flour and grist mills, 30 saw mills, 2 forges, 1 furnace, 24 tanneries, 15 tobacco factories, 25 churches, and 700 pupils attending public schools. Value of real estate in 1856, $2,453,264, showing an increase of 35 per cent. since 1850. Organized in 1784. Capital, Rocky Mount. VII. A N. co. of N. C., intersected by Tar river; area, about 450 sq. m.; pop. in 1850, 11,713, of whom 5,507 were slaves. The surface is level and the soil fertile. The productions in 1850 were 398,031 bushels of Indian corn, 53,798 of oats, and 300,268 lbs. of tobacco. There were 12 corn and flour mills, 10 saw mills, 2 tanneries, and 17 churches. The Raleigh and Gaston railroad passes along or near the W. border of the county. Formed in 1779. Capital, Lewisburg. Value of real estate in 1857, $1,077,721. VIII. A N. E. co. of Ga., bordering on S. C., drained by North and Hudson's forks of Broad river, and bounded on the N. E. by the Tugaloo; area, 650 sq. m.; pop. in 1852, 10,900, of whom 2,227 were slaves. It has a hilly surface and a productive soil, the river bottoms being particularly fertile. In 1850 it yielded 2,653 bales of cotton, 447,050 bushels of Indian corn, 104,764 of oats, and 114,331 of sweet potatoes. There were 4 saw mills, 1 flour mill, 1 cotton factory, and 30 churches. Gold has been found in small quantities, and iron is abundant. Value of real estate in 1856, $1,076,157. Capital, Carnesville. IX. A W. co. of Florida, bounded S. by the gulf of Mexico; area, 462 sq. m., including the islands of St. George and St. Vincent; pop. in 1850, 1,561, of whom 377 were slaves. The Appalachicola river, here navigable by steamboats, flows for some distance along its W. border, and then traverses its centre. Its valley is very fertile, but the soil elsewhere is sandy and little cultivated. The surface is low, and much of it covered with swamps and ponds. In 1850 the county contained 6 grist and 6 saw mills, 2 tanneries, 1 newspaper office, 3 churches, 1 academy, and 1 school. No returns were made of the agricultural products. Capital, Appalachicola. X. A N. W. co. of Ala., bordering on Mississippi, and bounded N. by Tennessee river, here navigable by steamboats; area, 1,260 sq. m.; pop. in 1850, 19,610, of whom 8,197 were slaves. It has a fertile, well cultivated soil, and a hilly surface partly covered with oak and other timber. The productions in 1850 were 15,045 bales of cotton, 892,891 bushels of Indian corn, 95,556 of oats, and 69,708 of sweet potatoes. There were 5 saw and 3 grist mills, 1 iron foundery, 7 tanneries, 2 newspaper offices, 33 churches, and 466 pupils attending public schools. The railroad from the head to the foot of Muscle shoals in the Tennessee has its W. terminus in this county, which is also traversed by the Memphis and Charleston railroad. Capital, Russellville. XI. A S. W. co. of Miss., watered by Homochitto river; area, about 730 sq. m.; pop. in 1850, 5,904, of whom 3,350 were slaves. Its surface is uneven, and its soil fertile near the rivers, but the land elsewhere consists chiefly of pine barrens. In 1850 the productions were 4,347 bales of cotton, 189,195 bushels of Indian corn, 4,995 of oats, 44,039 of sweet potatoes, and 83,220 lbs. of rice. There were 9 corn and flour mills, 4 saw mills, 14 churches, and 132 pupils attending public schools. Capital, Meadville. XII. A N. E. parish of La., watered by Bœuf and Macon bayous, the former of which is navigable by steamboats; area, 739 sq. m.; pop. in 1855, 3,621, of whom 1,908 were slaves. Its surface is hilly and its soil fertile. Cotton is the staple production. In 1855 there were raised 3,898 bales of cotton, and 88,320 bushels of Indian corn. Value of real estate, $544,701. Capital, Winnsborough. XIII. A N. W. co. of Ark., intersected by Arkansas river; area, 770 sq. m.; pop. in 1854, 3,976, of whom 572 were slaves. It has a hilly surface and some fertile soil, and in 1854 produced 1,156 bales of cotton, 244,285 bushels of Indian corn, and 5,384 of wheat. Capital, Ozark. XIV. A S. co. of Tenn., bordering on Alabama, and drained by the sources of Elk river; area about 780 sq. m.; pop. in 1850, 13,768, of whom 3,623 were slaves. The surface is hilly, the S. E. part being traversed by a branch of the Cumberland mountains. The soil is generally fertile. In 1850 it produced 788,380 bushels of Indian corn, 139,711 of oats, and 30,895 lbs. of tobacco. There were 25 corn and flour mills, 15 saw mills, 1 newspaper office, 35 churches, and 3,340 pupils attending public schools. It is traversed by the Nashville and Chattanooga railroad, which here passes through a tunnel 2,200 feet long. Capital, Winchester. XV. A N. co. of Ky., intersected by the Kentucky river; area, about 212 sq. m.; pop. in 1850, 12,462, of whom 3,365 were slaves. The river, which in this part of its course is navigable by steamboats, flows for some distance between perpendicular limestone cliffs several hundred feet high. In the N. part of the county it is joined by the Elkhorn. The surface is beautifully diversified and the soil productive. In 1850 it yielded 549,723 bushels of Indian corn, 25,335 of wheat, 98,742 of oats, and 87,125 lbs. of tobacco. There were 18 corn and flour mills, 10 saw mills, 2 woollen factories, 5 newspaper offices, 17 churches, and 556 pupils attending public schools. The Louisville and Lexington railroad passes through Frankfort, the capital of the state and county. Organized in 1794. XVI. A central co. of Ohio, watered by Scioto and Olentangy rivers; area, 530 sq. m.; pop. in 1850, 42,910. It has a level surface and a rich and generally well cultivated soil. In 1850 it produced 97,993 bushels of wheat, 2,521,988 of Indian corn, 174,963 of oats, 19,644 tons of hay, and 90,587 lbs. of wool. There were 14 corn and flour mills, 32 saw mills, 3 iron founderies, 3 woollen factories, 14 tanneries, 14 newspaper offices, 58 churches, 4 colleges, and 14,287 pupils attending public schools. Several railroads centre at Columbus, the county seat and state capital. XVII. A S. E. co. of Ind., bordering on Ohio, drained

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by Whitewater river and its head streams; area, about 380 sq. m.; pop. in 1850, 17,968. It has a diversified surface and a generally fertile soil. It supplies provisions for the Cincinnati market. In 1850 the productions were 1,002,149 bushels of Indian corn, 124,289 of wheat, 100,279 of oats, and 6,392 tons of hay. There were 12 corn and flour mills, 25 saw mills, 7 tanneries, manufactories of cotton and paper, 42 churches, 2 newspaper offices, and 2,315 pupils attending public schools. Blue or Trenton limestone is abundant. The Whitewater canal traverses the county. Capital, Brookville. Organized in 1810. XVIII. A S. co. of Ill., watered by Big Muddy river and Saline creek; area about 400 sq. m.; pop. in 1855, 7,182; in 1858, about 9,800. It is heavily timbered and fertile. In 1850 the productions were 268,690 bushels of Indian corn, 24, 883 of oats, and 3,008 of wheat. There were 14 corn and flour mills, 2 saw mills, 1 newspaper office, 15 churches, and 350 pupils attending public schools. Capital, Benton. XIX. An E. co. of Mo., bounded N. by the Missouri river; area, 874 sq. m.; pop. in 1856, 12,918, of whom 1,358 were slaves. It is drained by Maramec river, which is navigable by small steamboats, and with a little improvement might be made a channel of communication with the Virginia mines in this county. Rich mines of copper, lead, and coal are found on its banks and in other parts of the county. The surface is uneven and well timbered; the soil mostly fertile. In 1850 the productions were 51,960 bushels of wheat, 521,382 of Indian corn, 72,103 of oats, and 656,821 lbs. of excellent tobacco. There were 15 corn and flour mills, 8 saw mills, 1 newspaper office, 18 churches, and 461 pupils attending public schools. The Pacific railroad passes through the county, and a branch road from Franklin village in the E. part to the S. W. boundary of the state is in course of construction. Capital, Union. XX. A N. co. of Iowa, recently formed, drained by Iowa river and branches of the Red Cedar river; area, 576 sq. m.; pop. in 1856, 780. Productions in 1856, 761 bushels of wheat, 1,767 of oats, and 18,625 of Indian corn.

FRANKLIN. I. A port of entry and the capital of St. Mary's parish, La., situated on the right bank of the bayou Teche, 65 m. by water from the gulf of Mexico; pop. in 1853, about 1,400. It is the shipping point for large quantities of cotton, sugar, and maize, which are produced in the neighborhood, and is accessible by large steamboats. II. A post village and the capital of Johnson co., Ind., situated in a township of its own name on Young's creek, 20 m. S. S. E. of Indianapolis; pop. in 1853, about 2,000. It is one of the principal stations on the Madison and Indianapolis railroad, and the E. terminus of the Martinsville railroad. Beside the county buildings, it contains a large seminary, 5 or 6 churches, and a newspaper office. It is the seat of Franklin (Baptist) college, founded in 1835 under the name of the Baptist manual labor institute.

FRANKLIN, Benjamin, an American philosopher and statesman, born in Boston, Jan. 17, 1706 (O. S., Jan. 6) died in Philadelphia, April 17, 1790. His birth is recorded (of course under the second date) in the public register of Boston, and it appears that he was baptized on the same day. He was the youngest son, and youngest child except 2 daughters, of a family of 17 children; it appears that his lineal ancestors had also been youngest sons during 4 successive generations. It is a common saying among modern Englishmen that England owes her greatness to her younger sons. Franklin was called upon to endure no greater hardships perhaps than his brothers, yet certainly derived impulse in his career from those early privations which appear to foster greatness. His father, a non-conformist, had emigrated to New England in 1682 in search of religious freedom; his mother, the second wife of his father, was Abiah Folger, daughter of a distinguished colonist, Peter Folger, author of a poem in defence of liberty of conscience. Franklin's father, originally a dyer, became in Boston a tallow chandler and soap boiler. Having bound out his elder sons apprentices to trades, he designed the youngest "as a tithe of his sons" for the church; the child was accordingly placed at school at the age of 8 years, and manifested early aptitude for study. Before the end of a year, however, the proposed disbursement of the "tithe" was reconsidered, in consequence of narrowed circumstances; and at the age of 10 he was employed in cutting wicks and attending to the shop. This state of things became distasteful to an active, enterprising boy, whose disposition was for the sea, and who was the leader of his playmates in all their adventures. His father forbade all thought of the sea, and apprehending wilfulness about it, bound him an apprentice to his brother James, a printer. The boy, always fond of reading, and with access now to books, often sat up the most part of a night engaged in study. His earliest favorites were Defoe's "Essay on Projects," Mather's "Essays to do Good," Bunyan's works, Plutarch, and Burton's historical collections. He conceived also a fancy for poetry, and wrote ballads, the "Lighthouse Tragedy," the "Pirate Teach, or Blackbeard;" wretched stuff, he calls them. These were published, but his father looked discouragingly upon this proceeding, and "thus," adds the autobiographer humorously, "I escaped being a poet." Meeting with an odd volume of the "Spectator," he was so much delighted that he contrived ingenious methods of mastering the style and acquiring an ability in composition which he considered a principal means of his subsequent advancement. Mr. Sparks thinks him nevertheless to have been singularly regardless of literary reputation. It was less a primary object, after achieving a mastery of language, to become distinguished by it as an accomplishment, than to acquire power through it over the human mind, and the means of communicating most effectually and in the

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most attractive manner the benefit of his discoveries and research. Franklin had been disinclined to arithmetic, but at the age of 16 he felt its need, mastered it without assistance, and studied navigation. He read also at this period "Locke on the Human Understanding," the "Port Royal Logic," and a translation of Xenophon's "Memorabilia," with the style of which he was particularly pleased. He had read Shaftesbury and Collins, and becoming a sceptic, applied himself to skilful devices of argumentation gathered from the "Memorabilia," practised them as exercises in conversation, and often defeated antagonists whose cause and understanding were, as he afterward confessed, deserving of the victory. When about 16 years of age he met with a book by "one Tryon," recommending vegetable diet, which he adopted; it proved economical, and he gained thus an additional fund for purchasing books, and saved also much valuable time. "I made the greater progress," he said, "from the clearness of head and quicker apprehension which generally attend temperance in eating and drinking." Meantime he wrote a paper in a disguised hand for the "New England Courant," a journal published by his brother; it was printed as an anonymous contribution, met with approbation, and excited curiosity. Other communications followed in the same manner, and at length the young author was discovered. The brother took it amiss, and the circumstance was a first occasion of hard words; the young apprentice was beaten by a passionate master, who was little restrained by ties of consanguinity. From this early subjection to tyranny, Franklin thinks he may have first imbibed that hostility to arbitrary power which was one day to inspire a French statesman with one of the noblest lines of modern Latinity:

Eripuit cœlo fulmen, sceptrumque tyrannis.

Exception was taken by the general court to the political character of Franklin's newspaper. The elder brother was arrested and imprisoned, and the future publication of the journal by James Franklin was forbidden. In this conjuncture the younger Franklin undertook to elude the interdict by consenting to be nominal printer; an arrangement which required the cancelling of his indenture as apprentice. The brother, however, required new and secret indentures, which were accordingly executed. The paper reappeared, and was continued for several months, nominally printed and published by Benjamin Franklin. A fresh difference soon arose between the brothers, and the apprentice, supposing his master would not produce the secret articles of agreement, asserted his liberty. His brother's influence, however, prevented him from getting employment at any of the printing offices in Boston, and he resolved to go to New York in search of work. He accordingly induced the captain of a trading vessel to take him secretly on board, on pretence of escaping the consequences of an unfortunate intrigue. He sold his books, and in 3 days was in New York, at the age of 17, friendless, almost penniless, and without recommendations. Disappointed there, he continued his flight to Philadelphia. His voyage from New York to Perth Amboy in an open boat was eventful; he saved the life of a fellow passenger, a drunken Dutchman, who fell overboard; and after being 30 hours without food or water, he at length disembarked at Amboy, suffering from fever, which he says he cured by drinking plentifully of cold water. He walked thence to Burlington, and took boat to Philadelphia, arriving after some difficulty and danger at the foot of Market street at 9 o'clock on a Sunday morning. He had one dollar, and about a shilling in copper coin; the latter he gave to the boatmen. He bought 3 rolls of bread, and ate one as he walked up the street with the others under his arms, his pockets stuffed with stockings and shirts, and thus equipped he passed by the house of his future father-in-law; his future wife was at the door, and remarked the awkward and ridiculous appearance of the passer-by. He gave his rolls to a poor woman, and walked idly into a Quaker meeting house, where, there being no audible service, he fell into a comfortable sleep; it was the first house and the first repose of which he had the benefit in Philadelphia. He loved in after life to dwell upon these adventures, and found it well for his children to compare the "unlikely beginnings" of a homeless wanderer with the "figure he made afterward;" he might have added, in the words of a future eulogist, "as an ornament of America, and the pride of modern philosophy." He found employment as a printer without delay, obtained lodging at Mr. Read's, the father of the young lady who had noticed him eating his roll on the morning of his arrival, and tried to forget Boston. The governor of the province, Sir William Keith, accidentally saw one of his letters, and was struck with evidences of the writer's superiority. To the amazement of Franklin, Sir William sought him out, proposed to him to set up business for himself, and promised him the public printing. He was induced by these promises to consent to go to England to purchase types and material, and previously to doing so, to return to Boston to obtain his father's consent. This was withheld, and Franklin returning to Philadelphia remained some time longer with his first employers. In the mean time he had made progress in his courtship of Miss Read. The governor invited him often to his house, and adhered apparently to his original intention of setting him up in independent business. Arrangements therefore were completed for the voyage to London. His father's permission was no longer withheld. Miss Read consented to an engagement, and he embarked, being just 18. On arriving in London he discovered that he had been grossly deceived by the governor. Sir William Keith, "a good governor for the people, planned many excellent laws," but having "nothing else to give, had given expectations." Franklin was alone in a foreign country, without credit or acquaintance, and almost penniless. He

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promptly sought a printer, and took service for nearly a year. He fell into some extravagance, however, and committed follies of which he became ashamed, and from which he returned self-rebuked to industry and temperance. He wrote and published a metaphysical criticism upon Wollaston's "Religion of Nature;" his employer saw his talent and ingenuity, but expostulated against the principles advanced in his essay. The pamphlet was an introduction to some literary acquaintances. He had altercations with his fellow journeymen on the subject of temperance; they were beer-drinking sots, and many of them he reformed altogether; he was strong and athletic, while they could carry less and did less work. His skill in swimming attracted observation, and he gave exhibitions of the art at Chelsea and Blackfriars, which excited so much attention that he meditated opening a swimming school, and wrote 2 essays upon swimming; but in the mean time he entered into engagements with a good man, Mr. Denham, to return to Philadelphia and be his clerk in a dry goods shop. They sailed together from Gravesend, July 23, 1726, and landed at Philadelphia, Oct. 11. He kept an interesting journal of the voyage. He had been 18 months in London, had profited by advantages of acquaintanceship and books, but was unimproved in his fortunes. Sir William Keith had been superseded as governor; Franklin met him in the street, but seeing that he looked ashamed, passed on without remark. To Miss Read he had behaved badly. He had written to her but once during his absence, and that was to say that she was not likely to see him soon. She had been persuaded to marry another, and was now in sore affliction, her husband having absconded in debt, and under suspicion of bigamy. Franklin attributed her misfortunes to his own conduct, and resolved if possible to repair his error. It was doubtful whether a marriage with her would be valid; it had not been clearly ascertained that his "predecessor," as he styles him, had had a previous wife, and Franklin, whom Mr. Tuckerman calls the incarnated common sense of his time, did not forget that he might be called upon to pay his predecessor's debts. "We ventured, however," he adds, "over all the difficulties, and I took her to wife on the 1st of September, 1730." She proved a good and faithful helpmate; they throve together, and always endeavored to make each other happy. Some time before his marriage he suffered a serious illness; he believed himself to be dying, and was rather disappointed to find that he was getting well, and that he was to go over all the "disagreeable work" of dying some time or other again. A similar illness carried off his employer; and Franklin, forming a connection shortly afterward with a person who had money, established a newspaper, the "Pennsylvania Gazette," which was managed with great ability. He had already written the "Busybody," a series of amusing papers, for another journal, and was the leading member of a club called the junto, in which questions of morals, politics, and philosophy were discussed, and which he considered the best school of mutual improvement in the province. He very soon became a man of mark; his great intelligence and industry, his ingenuity in devising better systems of economy, of education and improvement, now establishing a subscription and circulating library, now publishing a popular pamphlet upon the necessity of paper currency (having previously contrived a copper-plate press, and engraved and printed the New Jersey paper money), and presently also his valuable municipal services, rapidly won for him the respect and admiration of the colonies. In 1732 he first published his almanac, under the name of Richard Saunders. It took the name of "Poor Richard's Almanac," and was continued profitably about 25 years. It is unnecessary here to allude to the profit derived from it to the people; the wise saws, the aphorisms, and encouragement to virtue and prosperity through the excellent proverbial sentences with which he filled the corners and spaces, became very popular, and they were at length spread over England and France in reprint and translations. In 1733, at the age of 27, he began to study the French, Italian, Spanish, and Latin languages; and after 10 years' absence from Boston, he revisited the scenes of his childhood, healing family differences, and consoling the deathbed of his brother with promises of provision for his son. Returning to Philadelphia, he was elected clerk to the assembly. Soon afterward he was appointed postmaster, and turning his mind upon municipal affairs, wrote papers and effected improvements in the city watch, and established a fire company. He became the founder of the university of Pennsylvania, and of the American philosophical society (1744), took active part in providing for defence against a threatened Spanish and French invasion, and invented the economical stove which bears his name; he declined to profit pecuniarily from this invention, although invited to do so by the offer of a patent. While in Boston in 1746, he witnessed some imperfect experiments in electricity; and having now means sufficient to withdraw from private business, he purchased philosophical apparatus and began his investigations (for an accounnt of which see ELECTRICITY, ELECTRO-MAGNETISM, and LIGHTNING). The invention of the lightning rod was a practical application of discoveries the most brilliant which had yet been made in natural philosophy. He was not allowed, however, to proceed immediately with his scientific pursuits. He was elected to the assembly in 1750; was appointed commissioner for making an Indian treaty, and in 1753 deputy postmaster-general for America; and was presented with the degree of master of arts by Harvard and Yale colleges. In 1754, the French war impending, he was named a deputy to the general congress at Albany. He proposed a plan of union for the colonies, which was unanimously adopted by the convention, but rejected by the board of trade in England as too democratic. He was ever afterward actively and zealously

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engaged in national affairs. We find him in Boston in 1754; and the French war having begun, he assisted Mr. Quincy in procuring a loan in Philadelphia for New England. He visited Braddock in Maryland, and modestly remonstrated against that general's expedition which resulted so disastrously. As postmaster-general, he was called upon, however, to facilitate the march of the army, and labored faithfully, and even to his own pecuniary disadvantage, in the service. After the defeat of Braddock, he was the means of establishing a volunteer militia, and took the field as military commander. After a laborious campaign it was proposed to commission Franklin as general in command of a distant expedition; but he distrusted his military capacities and waived the proposal. He resumed his electrical researches, and wrote accounts of experiments, which were read before the royal society of London, and procured for him the honor of membership; they also obtained for him the Copley gold medal, and were published in England and France. Sir Humphry Davy says of these papers that their style and manner are almost as admirable as the doctrine they advance. Franklin, he said subsequently, seeks rather to make philosophy a useful inmate and servant in the common habitations of man, than to preserve her merely as an object of admiration in temples and palaces. The great aim of his mind was ever practical utility, and although it has been said of him by English historians that he had usually a keen eye to his own interests, they are forced to add that he had ever a benevolent concern for the public good. Franklin, an active member of the Pennsylvania assembly, was indefatigable with his pen. The proprietary persisted in measures conflicting with the privileges of the inhabitants and with the public good; in consequence of which the deputies resolved to petition the home government for redress, and appointed Franklin their commissioner for the purpose. He published afterward (1759) the "Historical Review," which contained his papers in aid of the cause of his constituents, and had in the meanwhile obtained so much reputation, that Massachusetts, Maryland, and Georgia intrusted him with the agency of their affairs also. On making the English coast, the ship in which he had embarked narrowly escaped the rocks. In describing the circumstance to his wife he said: "Were I a Roman Catholic, I should perhaps vow to build a chapel in gratitude for this escape; but as I am not, if I were to vow at all, it should be to build a lighthouse." He arrived in London, July 27, 1757. Honors and compliments in abundance awaited him. Oxford and Edinburgh conferred upon him their highest academical degrees. He made personal acquaintance with the most distinguished men of the day, but never failed to bestow his principal attention upon the object of his mission. An illness of 8 weeks retarded progress, and great difficulties followed from many circumstances. Three years elapsed, and at length he succeeded in the principal objects of his mission to the entire satisfaction of his constituents. He suggested to the ministry the conquest of Canada, and his scheme was adopted. With Lord Kames and others in Scotland he passed 6 weeks of the "densest happiness," as he called it, of his life. He gave Lord Kames the famous "Parable against Persecution." He made further experiments in electricity, invented a musical instrument, the armonica (musical glasses), and received from the ministry a high proof of their consideration in the appointment of his son to the governorship of New Jersey. At the end of 5 years he reëmbarked for home, reaching Philadelphia Nov. 1, 1762. He received the official thanks of the assembly. New difficulties arising between the province and the proprietaries, he was again appointed agent to the English government, to petition that the king take Pennsylvania affairs into his own hands. He reached London early in Dec. 1764. The revolution was imminent. The project of taxing the colonies had been announced, and Franklin was the bearer of a remonstrance against it on the part of the provincial government of Pennsylvania. He was indefatigable in his exertions to prove the unconstitutionality and impolicy of the stamp act; and when the repeal of this obnoxious measure was attempted he underwent an examination before the house of commons (Feb. 3, 1766). The talents and greatness of the man are said to have never been more favorably exhibited than on this occasion. His conduct made it an everlasting record of his firm and patriotic spirit, of his wise and prompt foresight, the semblance of an almost inspired sagacity. The repeal of the stamp act was an inevitable consequence. He subsequently travelled in Holland and Germany with his friend Sir John Pringle; and visited Paris, where he met with due attention. Temporary tranquillity in America, after the repeal of the stamp act, was followed by commotions in Boston occasioned by the equally offensive revenue act, and others subversive of colonial rights. In 1772, a member of parliament, to convince Franklin that every perverse measure and every grievance complained of by the Americans originated not with the British government, but with tories in America, gave to Franklin a number of letters written from Massachusetts by Gov. Hutchinson and Lieut. Gov. Oliver, warmly urging coercive measures against the colonies. Franklin immediately sent these letters to the speaker of the Massachusetts house of representatives. Their publication caused great and just indignation in America, and was of invaluable service to the popular cause. The Massachusetts house petitioned the king that he would remove Hutchinson and Oliver from the government. Franklin appeared before the privy council, Jan. 29, 1774, to present their petition and advocate the removal. "He was now," says Bancroft, "thrice venerable, from genius, fame in the world of science, and age, being already nearly threescore years and ten."

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He was grossly reviled and shamefully insulted by Wedderburn the solicitor-general, who made against him a long personal harangue, amid the applauding laughter and cheering of the lords in council. Franklin bore this contumely with his accustomed patience and dignified equanimity. The petition was rejected, and the next day Franklin was dismissed from the office of deputy postmaster-general. Meanwhile he calmly pursued his honest and patriotic course, and found time for further research in science, for journeys again to Paris, Scotland, and Wales, and a visit to Ireland. He had determined to await in England the result of the continental congress. In the mean time Mrs. Franklin died. His parents and 15 of his sisters and brothers had all long been dead. A daughter alone was to remain to his solitude, his cherished son being about to sacrifice the ties of kindred to loyalty or political ambition. Franklin embarked for home in March, and arrived May 5, 1775, just 16 days after the battle of Lexington. He had labored faithfully in England to save the mother country from the final outbreak, and now repaired as faithfully to his duties in the congress. As a member of the committees of safety and foreign correspondence he performed most valuable services, exerting all his influence for a declaration of independence. That instrument he had the honor to assist in drafting, and to sign, July 4, 1776. He was sent soon after to Paris as commissioner plenipotentiary, together with Silas Deane and Arthur Lee. During the voyage he continued some interesting experiments which he had begun in the spring of the same year in relation to the Gulf stream. He was the first to make observations of this current; and his chart of it, published 90 years ago, still forms the basis of charts now in use. The learned superintendent of the coast survey, Prof. Bache, made this statement in a lecture in Feb. 1858, and added that Franklin's theory illustrating in general the results of the great transfer of tropical water to the north is advocated by modern philosophers. On arriving in France, Franklin established himself almost immediately at Passy. A French writer (Lacretelle) of high celebrity says that "by the effect which Franklin produced, he appears to have fulfilled his mission, not with a court, but with a free people." Men appeared to look on him as a sage come from a new world to unfold mysteries. He was not at first received officially, but soon gained influence with the ministry; and upon receipt of news of Burgoyne's disaster, he had the happiness to conclude the treaty of Feb. 6, 1778. English emissaries came to Paris thereupon to sound Franklin upon the subject of reconciliation, of which they discovered that independence was to be the sole basis. His prudence and sagacious firmness defeated every attempt of the British government to sow discord between America and her ally. He was now accredited to the French king as minister plenipotentiary (1778), and subsequently one of the commissioners for negotiating peace with the mother country. His diplomatic career forms a chief chapter in the history of his country. He signed the peace Nov. 30, 1782, and now longed to return. He was not able to do so, however, until 1785, when, after 53 years in the service of his country, he retired to private repose. Before leaving Paris he concluded the treaties with Sweden and Prussia, embodying many of his great international principles. He had been throughout the whole period of his mission an object of marked enthusiasm. His venerable age, his plain deportment, his fame as a philosopher and statesman, the charm of his conversation, his wit, his vast information, his varied aptitudes and discoveries, all secured for him not only the enthusiastic admiration of Europe, but a circle of ardent friends, embracing the very widest range of human characters. His simple costume and address, and dignified aspect, among a splendidly embroidered court, commanded the respect of all. "His virtues and renown," says M. Lacretelle, "negotiated for him; and before the second year of his mission had expired, no one conceived it possible to refuse fleets and armies to the countrymen of Franklin." On his return to Philadelphia (Sept. 14, 1785), he was elected "president of Pennsylvania." Washington, with whom he enjoyed an uninterrupted friendship, was among the first to welcome him. At the age of 82, he consented to be a delegate to the convention for forming the federal constitution. He entered actively and heartily into the business of the convention. He served also as president of the society for political inquiries, and wrote interesting and vigorous papers upon many important subjects. In his 84th year he wrote to Washington: "For my personal ease I should have died two years ago; but though those years have been spent in excruciating pain, I am glad to have lived them, since I can look upon our present situation." His faculties and affections were unimpaired to the last. At his death 20,000 persons assembled to do honor to his remains. He was interred by the side of his wife in the cemetery of Christ church. Throughout the country every species of respect was manifested to his memory; and in Europe extraordinary public testimonials are on record of honor due to one of the greatest benefactors of mankind. Fault has been found with his religious character. He confesses that during a period of his life, before the age of 21, he had been a thorough deist; and it has been said that 5 weeks before his death he expressed a "cold approbation" of the "system of morals" of "Jesus of Nazareth." Whatever his faith and doctrine may have been, his reverence for religion and Christian institutions was constantly manifest. It was Franklin who brought forward a motion for daily prayers in the Philadelphia convention. The motion was rejected, as "the convention, except 3 or 4 persons, thought prayers unnecessary." We find him advising his daughter to rely more upon prayer than upon preaching; and as a practical moral adviser he has left us beautiful teachings,

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at least, of scarcely surpassed human wisdom. At the most critical epoch of his public life, when beset with menace, jealousy, bribery, and official caprice and injustice, he said: "My rule is to go straight forward in doing what appears to me to be right, leaving the consequences to Providence." Franklin was a strong, well formed man. His stature was 5 feet 9 or 10 inches. His complexion was light, his eyes gray. His manners were extremely winning and affable. His name is not borne by any of his descendants. His daughter, Sarah, the wife of Richard Bache, bore 7 children, whose living descendants are numerous.—The last of his race who bore his name was his grandson, William Temple Franklin, who died in Paris, May 25, 1823, and who published in London and Philadelphia, between 1816 and 1819, editions of his grandfather's works. The complete edition of the works of Franklin, edited by Jared Sparks, appeared in Boston in 12 vols. 8vo. in 1836–'40, with notes and a life of the author (new edition, Philadelphia, 1858).

FRANKLIN, Sir John, an English admiral and arctic explorer, born at Spilsby, Lincolnshire, April 16, 1786. He was the youngest son of a respectable yeoman, whose patrimonial estate was so burdened with mortgages that to maintain and educate a family of 12 children he was obliged to sell it and engage in trade. John, his youngest son, was intended for the clerical profession, and received his early education at St. Ives and at the grammar school of Louth. He soon showed, however, a decided predilection for the sea. While a school boy at Louth, he, with one of his comrades, took advantage of a holiday to walk to the coast, 12 miles distant, merely to look at the ocean, which he then saw for the first time, and upon which he gazed for many hours with intense satisfaction. His father, hoping that his inclination for the life of a sailor would be removed by an experience of its discomforts, permitted him to make a voyage to Lisbon in a small merchant vessel. But this experiment only confirmed the boy's fondness for the sea, and his father, deeming it hopeless to overcome so strong a propensity, yielded to it, and procured him admission to the navy as a midshipman at the age of 14. He entered on board the ship of the line Polyphemus, and served in her at the battle of Copenhagen, April 2, 1801. A midshipman who stood at his side was shot dead during the engagement. In the ensuing summer he joined the Investigator, which was commanded by his cousin, Capt. Flinders, and was commissioned by the English government to explore the coasts of Australia. After nearly two years spent in this service, which was eminently of a nature to qualify him for his future pursuits, the Investigator proving unseaworthy, Franklin and the rest of her officers sailed for home in the store ship Porpoise; but that vessel was wrecked Aug. 18, 1803, on a reef about 200 miles from the coast of Australia, and he and his companions remained for 50 days on a sand bank 600 feet in length until relief arrived from Port Jackson. Franklin was carried to Canton, where he obtained passage to England in a vessel of the China fleet of Indiamen, commanded by Sir Nathaniel Dance. On their voyage home they were attacked in the strait of Malacca, Feb. 15, 1804, by a strong French squadron, which they beat off. Franklin during the battle acted as signal midshipman. On reaching England he joined the ship of the line Bellerophon, and in 1805 took part in the battle of Trafalgar as signal midshipman, performing his functions with distinguished coolness and courage in the midst of a hot fire. Of 40 persons who stood around him on the poop, only 7 escaped unhurt. For 6 years subsequently he served in the Bedford on various stations, the last of which was the coast of the United States during the war of 1812–'15. He commanded the boats of the Bedford in a fight with the American gun boats at New Orleans, one of which he boarded and captured. He was wounded in the action, and for his gallantry was made a lieutenant. In 1818, the British government having fitted out an expedition to attempt the passage to India by crossing the polar sea to the north of Spitzbergen, Franklin was appointed to the command of the Trent, one of the two vessels of the expedition; the other, the Dorothea, being commanded by Capt. Buchan. After passing lat. 80° N. the Dorothea received so much damage from the ice that her immediate return to England was decided on. Franklin begged to be permitted to continue the voyage with the Trent alone, but his commander, Capt. Buchan, would not consent, and the two vessels returned to England together. Franklin's conduct on this occasion brought him prominently into notice, and gave him a high reputation as a bold and thorough seaman and a competent surveyor and scientific observer. In 1819, on the recommendation of the lords of the admiralty, he was appointed to the command of an expedition to travel overland from Hudson's bay to the Arctic ocean for the purpose of exploring the coast of America eastward from the Coppermine river. (For an account of this and his other arctic expeditions, and of those sent in search of him, see Arctic Discovery.) Franklin returned to England in 1822. During his absence he had been promoted to the rank of commander, and shortly after his arrival home was made a post captain and elected a fellow of the royal society. In 1823 he published a narrative of his journey, and in August of the same year he married Eleanor Porden, daughter of an eminent architect. In 1825 he was appointed to the command of another overland expedition to the Arctic ocean. When the day assigned for his departure arrived, his wife was lying at the point of death. She, however, insisted that he should not delay his voyage on her account, and gave him as a parting gift a silk flag, which she requested him to hoist when he reached the polar sea. She died the day

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after he left England. He returned home by way of New York, arriving at Liverpool, Sept. 24, 1827, and on March 8, 1828, he was married to Jane Griffin, the present Lady Franklin. In the same year he published a narrative of his second expedition. In 1829 he was knighted, and received the degree of D.C.L. from Oxford university and the gold medal of the geographical society of Paris. In 1830 he was sent to the Mediterranean in command of the Rainbow; and having rendered some service to the Greeks in their struggle for independence, he was decorated by King Otho with the cross of the Redeemer of Greece. While on this station he was noted for his attention to the comfort of his crew, and the sailors expressed their sense of his kindness by calling his vessel the "Celestial Rainbow" and "Franklin's Paradise." In 1836 he was made governor of Tasmania or Van Diemen's Land, in which office he continued till 1843. He was a very popular governor, and originated and carried many measures of great importance to the colony. He founded a college and gave it large endowments from his own funds, and exerted himself to have it conducted in the most liberal manner, without regard to distinctions of sect. In 1838 he founded the scientific association now known as the royal society of Hobarton; during his administration its papers were printed at his expense. When the colonial legislature voted an increase to the governor's salary, Sir John refused to accept it for himself, but secured the additional appropriation for the benefit of his successor. On the day of his departure from the colony the most numerous gathering of the people that had ever been seen in Tasmania attended him to the place of embarkation, the bishop of the colony walking at their head. He was also complimented by addresses from every district of the island. Long afterward the remembrance of his virtues drew from the inhabitants of Tasmania a contribution of £1,700, which was sent to Lady Franklin to assist in paying the expenses of the search for her missing husband. In 1845 Sir John was appointed to the command of a new expedition to discover the N. W. passage. It consisted of the ships Erebus and Terror, which were furnished and fitted out in the strongest and most complete manner, and manned by picked crews, amounting in all, officers and men, to 138 persons. They sailed from Sheerness, May 26, 1845. Franklin's orders were to return in 1847. He was last seen by a whaler who met him in Baffin's bay, July 26, 1845. In 1848, no tidings of the expedition having reached England, the anxiety of the public as to his fate led to the fitting out of several expeditions in search of him. In the spring of 1850, as Dr. Rae ascertained in 1854, a party of about 40 white men were seen by the Esquimaux on King William's island, and a few months later the savages found their bodies at a point not far to the N. W. of Back's Great Fish river. From articles picked up by the Esquimaux it is certain that these men were a portion and probably the last survivors of Franklin's expedition. He himself had doubtless already perished, for the party as described by the Esquimaux contained no man so old as Franklin, who in 1850 would have been 64 years of age.—See "Narrative of a Journey to the Shores of the Polar Sea in 1819–'22," by Capt. John Franklin (London, 1823); "Narrative of a Second Expedition to the Shores of a Polar Sea, in 1825–'27," by the same (London, 1828). These works have been reprinted in England and America.—Eleanor Ann, an English poetess, first wife of the preceding, born in July, 1795. Her father, William Porden, was the architect of Eaton hall, and of other noted buildings. At an early age she manifested remarkable talents, and especially an aptitude for languages. Almost unassisted she taught herself Greek and Latin when only 11 or 12 years old. She soon acquired several other languages, and a general knowledge of all the principal sciences, especially of botany, chemistry, and geology. At the age of 15 she began to write, and in her 17th year she produced a poem in 6 cantos, "The Veils, or the Triumphs of Constancy," which attracted considerable attention on its publication in 1815. Her next publication, "The Arctic Expedition, a Poem" (1818), led to her acquaintance with Capt. Franklin, and to their marriage in Aug. 1823. In the previous year her longest and best poem, "Cœur de Lion, or the Third Crusade," in 16 cantos, was published. She died of consumption, Feb. 22, 1825, the day after her husband sailed on his second expedition to the Arctic shores. Her poems, with the exception of "Cœur de Lion," were collected and published in London in 1827.—Lady Jane, second wife of Sir John Franklin, an Englishwoman distinguished for the devoted perseverance with which she has labored for the rescue of her husband from the perils of his last arctic expedition, born about 1800. She was the second daughter of John Griffin, Esq., F.S.A., and is of French Huguenot descent on her mother's side. While in Tasmania she rendered a permanent service to the country by paying out of her private purse a bounty of 10 shillings each for the destruction of a dangerous species of serpent, which in consequence was soon exterminated. She has expended nearly all her fortune in the search for her husband, and is still urging new expeditions to seek for his remains.

FRANKLIN, William, the last royal governor of New Jersey, son of Benjamin Franklin, born in Philadelphia about 1731, died in England, Nov. 17, 1813. In childhood he was, like his father, remarkably fond of books, and likewise of an adventurous disposition. He sought to go to sea in a privateer during the French war (1744–'8), and, disappointed in this, obtained a commission in the Pennsylvania forces, with which he served in one or two campaigns on the Canadian frontier, and rose to be captain before he was of age. After his return to Philadelphia he soon obtained offi-

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cial employment through his father's influence. From 1754 to 1756 he was comptroller of the general post office, and was during part of the same period clerk of the provincial assembly. In 1757 he accompanied his father to London, where he studied law and was admitted to the bar in 1758. In 1762, while yet in Europe, he was appointed governor of New Jersey, to which province he returned in 1763. In the revolutionary contest he remained loyal to Great Britain, and some of his letters containing strong expressions of tory sentiments having been intercepted, he had a guard put over him in Jan. 1776, to prevent his escape from Perth Amboy. He gave his parole that he would not leave the province, but in June of that year he issued a proclamation as governor of New Jersey summoning a meeting of the abrogated legislative assembly. For this he was arrested by order of the provincial congress of New Jersey and removed to Burlington as a prisoner. He was soon after sent to Connecticut, where he was detained and strictly guarded for upward of two years, till in Nov. 1778, he was exchanged for Mr. McKinley, president of Delaware, who had fallen into the hands of the enemy. Gov. Franklin after his liberation remained in New York till Aug. 1782, when he sailed for England, in which country he continued to reside till his death. The English government granted him £1,800 in remuneration of his losses, and in addition a pension of £800 per annum. William Franklin's adhesion to the royal cause led to an estrangement between him and his father, which continued after the revolutionary contest was over. The son made advances toward a reconciliation in 1784, which drew from the father the declaration that he was willing to forget the past as much as possible. In 1788, however, in a letter to Dr. Byles, he speaks of his son as still estranged. In his will, he bequeathed to William his lands in Nova Scotia, and released him from all debts that his executors might find to be due from him, and added this clause: "The part he acted against me in the late war, which is of public notoriety, will account for my leaving him no more of an estate he endeavored to deprive me of."

FRANKLINITE, a mineral composed of peroxide of iron, oxide of zinc, and oxide of manganese, in appearance much like the magnetic oxide of iron. It is found in considerable quantity only in Sussex co., N. J., although it is also mentioned as accompanying ores of zinc in amorphous masses at the mines of Altenberg (Vieille Montagne), near Aix la Chapelle. The composition of the Franklinite of New Jersey is:

Constituents.	Berthier.	Thompson.	Dickinson.	Abich.
Peroxide of iron.....	66 00	66.10	66.115	68.86
Oxide of zinc.....	17.00	17.43	21.771	10.81
Oxide of manganese...	16.00	14.96	11.987	18.17
Silica.....	....	....	0.127	.. ..

Its hardness is 5.5–6.5; specific gravity, 5–5.09. It occurs in large veins or beds at the mines of the New Jersey zinc company at Stirling hill and Mine hill in Sussex co., accompanied by the red oxide of zinc, lying between the crystalline limestone and the gneiss rocks. At Stirling hill it constitutes the main substance of two beds of considerable magnitude, lying in immediate contact with each other, divided only by a parting seam, running S. W. and N. E., and dipping S. E. about 40° from the hill against which the beds seem to repose, toward and under the bed of the Walkill river. The upper of these beds, lying immediately under the crystalline limestone, is composed chiefly of the red oxide of zinc with the Franklinite interspersed in granular masses, often assuming the appearance of imperfect crystals. It presents a thickness varying from 3 to 8 feet, and is traced with great uniformity of structure. At times almost perfect crystals of Franklinite are found, particularly where the bed comes in contact with the superincumbent limestone; these crystals are of the regular octahedral form with the edges replaced. The Franklinite constitutes about 45 per cent. of the mineral contents, the rest being mainly red oxide of zinc. This bed is extensively worked by the New Jersey zinc company, who remove annually about 8,000 tons of the ore to their works at Newark, where they manufacture from it the white oxide of zinc used for paint; the residuum, after the oxide of zinc is driven off, being Franklinite, is smelted into iron. The underlying bed appears on the surface or outcrop to be almost a pure massive Franklinite, amorphous in structure, although occasionally also exhibiting very large and nearly perfect crystals of the Franklinite; it contains no red oxide of zinc, which fact is the distinctive feature between this and the overlying bed, which is generally known as the bed of red zinc. As the underlying bed of Franklinite descends it becomes less pure, the Franklinite being replaced by the crystalline limestone, with the Franklinite and willemite (anhydrous silicate of zinc) thickly interspersed in grains and imperfect crystals. It preserves this character in its entire depth as far as explored, nearly 200 feet below its outcrop; this bed is about 12 feet in thickness, but is not worked. Several hundred feet westwardly of these main beds, and higher up on the hill, another bed of Franklinite, mixed with a little of the red oxide and a good deal of the silicate of zinc, is found, running the entire length of Stirling hill; on the S. W. point of this vein a considerable quantity of ore is mined by the Passaic zinc company, and by them manufactured into the white oxide of zinc at their works at Bergen, near Jersey City. The other locality where the Franklinite is found in large masses is on Mine hill, about 1¼ miles N. E. from Stirling hill, following the course of the Walkill to the village of Franklin. Here there are also found two distinct beds lying in immediate juxtaposition; but their relative position, as compared with that of the beds at Stirling hill, is reversed, the Franklinite being the easternmost and uppermost, and the zinc being the underlying and westernmost. The formation generally on Mine hill seems

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considerably disturbed, and much less regular than on Stirling hill. The Franklinite on Mine hill, which promises from surface indications to be a rich and regular body of ore, has however not proved so in the numerous openings and explorations made by the Franklinite iron company, who erected a large blast furnace here some 4 years since for the express purpose of working this ore. They found it so much disturbed, and immediately below the outcrop so much mixed with other and useless substances, chiefly an impure garnet (silicate of iron), as to make the ore unfit for any metallurgical purpose. The attempts to smelt it did not prove successful, and the works were abandoned. The underlying or westerly bed, on the other hand, is much purer, and is composed of massive Franklinite, interspersed throughout with more or less red oxide of zinc in spangles or small lamellar masses. Its outcrop is plainly traceable along the entire crest of Mine hill for nearly half a mile in length, varying from 3 to 5 feet in thickness; it has been worked to some extent by the New Jersey zinc company. A late examination of this ore by Professors J. D. Dana and B. Silliman, jr., shows it to be composed of 46 to 48 per cent. of Franklinite, the rest being mainly red oxide of zinc, yielding, exclusively of the zinc in the Franklinite, 26 per cent. of oxide of zinc.—As has been already stated, the New Jersey zinc company, after extracting the zinc in the shape of the white oxide from the ores of Stirling and Mine hills, smelt the residuum, consisting almost wholly of Franklinite, into iron. Attempts had been made many years since by some of the iron works in the neighborhood to smelt the Franklinite ore which appeared in such large masses and so easy to be mined; but none of these early operations proved successful, owing, no doubt, to the great quantity of zinc in the ore, which in its process of volatilization absorbs a large amount of heat, and thereby tends to chill the furnace. Early in 1853 Mr. E. Post, of Stanhope, N. J., undertook to work the ore with anthracite in one of the blast furnaces at Stanhope, and succeeded in making some pig iron of excellent quality; but these operations were soon discontinued. In the same year Mr. C. E. Detmold successfully and permanently established the manufacture of iron from the zinc and Franklinite ores at the works of the New Jersey zinc company (of which he was then president), by smelting the residuum, after the zinc had been driven off, for the purpose of making the white oxide. This branch of industry is calculated to become one of much importance, as the iron produced from this residuum not only yields a bar iron of remarkable purity, fibre, and strength, but is especially suited to the manufacture of steel. The furnace in which this iron is made is 18 feet high and 8½ feet diameter of bosh; it produces annually about 2,000 tons, and works uninterruptedly with very great regularity. The pig iron produced is almost identical in character, appearance, and structure with the best lamellar iron made of the famous spathic ores of Siegen and Müsen in Germany. Its fracture shows large and brilliant silver-white lamellar facets, sometimes beautifully crystallized, and so hard as to cut glass; these crystals are not attracted by the magnet. (See Prof. J. Wilson's special report in the "General Report of the British Commissioners," presented to parliament, Feb. 6, 1854.) An analysis of this iron gives in 100 parts: iron, 88.30; carbon combined, 5.48; carbon free (graphite), 0.00; manganese, 4.50; silicium, 0.20; zinc, 0.30; sulphur 0.08; phosphorus, 0.15; loss, 0.99.

FRANKS, a confederacy of German tribes, which first appeared under this name near the lower Rhine, about the middle of the 3d century. The name is variously derived from *framea*, a weapon of the ancient Germans mentioned by Tacitus, from a Germanic word meaning free, and from another meaning exile. It is now generally believed that the tribes which constituted the bulk of the Frankish confederacy were the same which were known to the Romans in the time of the first emperors, under the names of Sigambri, Chamavi, Ampsivarii, Bructeri, Chatti, &c. The first mentioned were the most powerful. A part of these tribes had passed the Rhine as early as the 1st half of the 1st century. In the 3d and 4th larger bodies successively passed into the N. E. part of Gaul, which country was finally wrested by them from the Romans in the 5th century. Under Probus they appear as dangerous enemies of the Romans. Carausius, who was appointed to defend the province against them both by land and sea, having betrayed his master, and assumed the purple in Britain, made them his allies, surrendering to them the island of the Batavi and the country on the Scheldt. Constantius I. and Constantine the Great expelled them from this territory, but they soon invaded it again, and were finally left in its possession by Julian. From that period they appear to form two separate groups, the Salian (from the old German *sal*, sea, or from *Sala*, the ancient name of the river Yssel), and Ripuarian (from the Latin *ripa*, bank of a river). The former continued the attacks on Gaul during the 5th century, and conquered the greater part of it under the Merovingian king Clovis; the latter spread southward on both sides of the upper Rhine, extending their conquests W. as far as the Meuse, and E. as far as the head of the Main. From them the country adjacent to the Main derives its modern name of Franconia. The Franks form an element in the modern population of France, as well as of S. W. Germany. Their two divisions had separate laws, which were afterward collected in two codes, known as *Lex Salica* and *Lex Ripuariorum*.

FRASCATI, a town of the Papal States, in the Campagna, on the N. W. declivity of the Tusculan mount, 8 m. E. S. E. from Rome; pop. about 5,000. It was the favorite summer residence of the Roman nobility and cardinals

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for some centuries; and many of their magnificent villas remain as monuments of the taste and opulence of their proprietors. Of these the most celebrated is the villa Aldobrandini, which is adorned with numerous fountains, water works, and paintings. The villa Rufinella was once the property and abode of Lucien Bonaparte. On the summit of the mountain, at an elevation of 2,000 feet above the level of the sea, and about 2 miles from Frascati, are the ruins of Tusculum, round which clustered in the palmy days of republican and imperial Rome the villas of her patricians, orators, and emperors.

FRASER, CHARLES, an American artist, born in Charleston, S. C., Aug. 20, 1782. In early life he evinced a strong disposition to become a painter, and at 12 or 14 years of age was in the habit of employing his pencil to depict the scenery of Charleston and its neighborhood. His friends, however, deeming it necessary that he should adopt one of the learned professions, at the age of 16 he became a student of law. At the end of 3 years he commenced the study of his favorite art, but becoming discouraged he resumed his legal studies in 1804, and in 1807 was admitted to practice. By close attention to business he was enabled to retire at the end of 11 years with a competency, and in 1818 he reëmbarked in the career of an artist. The example of Malbone, with whom in his youth he had been on terms of intimacy, induced him to give his attention to miniature painting, a branch of the art which he has followed more persistently than any other, and in which he has attained eminent success. In 1825 he painted the portrait of Lafayette, and probably nearly every citizen of South Carolina distinguished in the history of the state during the last 50 years has been numbered among his sitters. He has also produced many portraits, landscapes, interiors, historical pieces, and pictures of *genre* and still life, the greater part of which are owned in South Carolina. Mr. Fraser also possesses a high reputation in the South as a contributor to periodical literature, and the author of occasional addresses. He has produced several poems characterized by elegance of diction and elevation of thought. In 1857 an exhibition of his collected works was opened in Charleston, numbering 313 miniatures, and 139 landscapes and other pieces in oils.

FRASER RIVER. See COLUMBIA, BRITISH.

FRATERNITIES, or CONFRATERNITIES (Lat. *fraternitas*, brotherhood), associations of men for mutual benefit or pleasure, or in a more restricted sense, religious societies for purposes of piety or benevolence. In the latter meaning it generally designates lay organizations. During the middle ages such fraternities were extremely popular, and scarcely any external act of devotion, except joining a religious order, was thought more meritorious. Many sorts of these societies might be mentioned. With some, like the confraternity of Notre Dame, founded at Paris in 1168, and composed of 36 priests and 36 laymen, symbolical of the 72 disciples of Christ, the main object was perfection in spiritual life; such are the numerous sodalities (Lat. *sodalis*, a companion) which have spread from Rome all over the world. With others it was practical philanthropy; with others, penitential works. There were fraternities of pilgrims; fraternities of the Passion, whose members performed mysteries in the theatres; fraternities of merchants, tradesmen, and artisans; and fraternities, like the *fratres pontifices*, who flourished in the south of France from the 13th to the 15th century, who took upon themselves the construction and repair of bridges, roads, and hospitals, the keeping up of ferries, and the security of the highways. Many of them obtained the sanction of the church; others met with great opposition, and were finally suppressed as heretical. Not a few acquired in time a political character, or concealed one from the first under the guise of religion. The brethren of the white caps, so called from their peculiar head gear, were established about the end of the 12th century in the south of France by one Durand, a carpenter. Their professed design was to rid the country of the marauders disbanded from the armies of Henry II. and Philip Augustus; but having accomplished this, they undertook to forbid the lords to receive dues from their vassals, and were consequently soon put down. During the struggle between Simon de Montfort and Count Raymond of Toulouse, a confraternity of white brethren was founded at Toulouse (1210), in the interest of Montfort, and was opposed by the black company attached to Count Raymond. The whites were afterward remembered for their cruelty at the taking of Lavaur (1211). Of other associations, both orthodox and otherwise, some of the most noted are the Beguins or Beghards (see BEGUINS); the Alexians, called also Lollards, Cellites, and Matemans, who devoted themselves to works of benevolence, and have left much of their spirit to the burial societies of Cologne and other European cities; the brothers of the common life, founded about 1380, and composed mainly of clergymen engaged in copying books; the flagellants; the calendar brothers of Germany; the brothers of death of the order of St. Paul, founded at Rouen in 1620, and suppressed by Pope Urban VIII.; and the fraternity of the Holy Trinity, founded by St. Philip Neri in 1548, for the relief of pilgrims and others. St. John of God, a Portuguese, established in the 16th century a society for the relief of the sick and poor, the members of which were known in Spain as brethren of hospitality, in France as brethren of Christian love, and in Germany as brethren of mercy. The brothers of the Christian schools, the brethren of the holy cross, and many similar associations for works of charity and education, are now spread over the world. Of the purely lay fraternities, one of the most extensive is the benevolent society of St. Vincent de Paul, founded in the 17th century, which has branches in most of the cities of the United States. In

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the city of Rome there are nearly 200 societies whose members visit the hospitals, bury the dead, instruct poor children, and supply portionless girls with dowers. The confraternity of St. Yves, composed of lawyers, undertakes the defence of the poor before the courts; that of the *pericolanti* protects young girls whose virtue is in danger; that of St. Jerome, *della carita*, is specially devoted to prisoners. The fraternity of St. Giovanni Decollato attends culprits to execution. The *sacconi*, so called from a peculiar dress which conceals the face and prevents the wearer from being recognized, go about the city at certain times barefooted to collect alms for pious purposes. Among fraternities may be numbered several congregations of priests who apply themselves to special objects, and generally live in common, without being bound by the ordinary monastic vows. Such are the priests of the oratory, organized at Rome by St. Philip Neri, in 1548, for mutual edification; the French oratory of Jesus, founded by Cardinal Berulle in 1611, for the reformation of the clergy; and the society of St. Sulpicius, which takes an active share in the education of candidates for orders.

FRAUD. There are few principles of law more often or more emphatically asserted than that fraud avoids every contract tainted with it, and annuls every transaction. It is seldom that this is not true; but there are certain rules and qualifications which must be known, if the practical application of the principle would be understood. Thus, fraud does not so much make the contract tainted with it void, as voidable. This is an important practical distinction, for a void contract has, and can have, no efficacy whatever, being simply nothing; whereas he who is defrauded in a contract or transaction may still be on the whole benefited by it, and he may certainly waive his right to avoid it for the fraud; and if he does so, the fraudulent party cannot insist that his own fraud has liberated him from his own engagements, and annulled his obligations. It is very difficult to give a legal definition of fraud; but it may be said to be any deception by which another person is injured. This definition, however, leaves it necessary to explain how far such deception may be carried, and what its character must be, before the law recognizes it as fraud, and will permit a party injured by it to find legal redress, either by annulling his engagements or otherwise. For it is certain that all deception is not fraud in law. The Roman civil law used the phrase *dolus malus*, evil deceit, to express the fraud which the law dealt with. We have no similar phrase in our law, but we have an exactly similar distinction, although it is one which it is difficult to define, or even to illustrate. The law of morality and of religion is plain and simple: "Do unto others as you would have them do unto you;" and any craft or cunning, any concealment or prevarication, or consent to self-deception, by which one may make gain over another, is clearly a violation of this law. But it is certain that there is a large amount of craft, and a very cunning kind of deception—active or passive—of which the law takes no cognizance, and which characterize a very large proportion of the common transactions of society. Somewhere the law draws a line between that measure and that manner of deception against which it directs men to protect themselves by their own caution, under the penalty of suffering without remedy any mischiefs which may result from their want of skill or care, and that larger or deeper or more important kind of deception, which it considers unreasonable to require that men should guard themselves from without its aid, and which therefore it will lay a strong hand upon and suppress or render harmless whenever it is detected. But where this line is drawn it would be impossible to declare by any formula. Indeed, there are whole classes of cases in which it may be considered as not yet settled what the law is in this respect. Thus, the law of warranty has been expressly founded in England and the United States upon the rule *caveat emptor*, or, let the buyer beware; and it was once applied almost to the extent of holding that if a buyer did not choose to obtain an express warranty of the thing sold, he was remediless, whatever might be the amount of deception practised upon him, or rather, whatever might be the degree or the way in which he was permitted to deceive himself. But, in the article WARRANTY, we shall show that there has been an important modification of the law in this respect.—While it is impossible to state precisely by definition what frauds the law will recognize and treat as such, and what it will not, there are some leading principles which run through the adjudication on this subject, and may help to a just understanding of this matter. One of these is, that the fraud must be material to the contract or transaction, and as it were enter into its very essence and substance; and the best test of this may be found in the question, would the transaction have taken place if the fraud had not been practised? For if it would not, the fraud was material. Another is, that the fraud must work an actual and substantial injury, for mere intention or expectation is not enough. Another is, that the defrauded party must not only have believed in point of fact the false statement, but must have had a rational right to believe it, because he cannot call upon the law to protect him from the consequences of his own neglect or folly. Here the law looks carefully at the injured person's ability to protect himself; and it is far more liberal in its suppression of fraud, or in remedying its consequences, when that fraud was practised against one who from age, infirmity of mind or body, or the confidence arising from a fiduciary relation, has a right to call on the law for its protection. Another distinction which the law makes is founded on practical reasons, which amount indeed to a necessity, but is scarcely sustained by principles of morality; it is that

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between concealment and misrepresentation. In some branches of the law, as that of insurance, the distinction is of little value, but generally it has much force. Thus, if one buys goods who is at the time insolvent, but says nothing about his affairs, the sale is valid, and the property passes to the buyer, leaving the seller only his claim for the price. But if the buyer, being insolvent, falsely represents himself to the seller as having sufficient resources to justify the sale or credit, this is a fraud which permits the seller to avoid the sale, and to reclaim the goods. (See FALSE PRETENCES.) The question how far one is bound to communicate to another any special facts which he knows, or indeed any information which he possesses, has often passed under adjudication. That a sale is not voidable merely because the buyer knew what the seller did not, and bought because of his better knowledge, is both certain and obvious; and perhaps it is equally certain and obvious that if the law annulled all transactions of this kind, a very large proportion of all the buying and selling—of all that goes under the name of speculation—must come to an end. The supreme court of the United States has distinctly held that a buyer is not bound to communicate to a seller extrinsic circumstances which were very material to the price, and were known to the buyer alone. Still, while the law is so in general, there are cases in which the concealment of special knowledge invalidates a transaction founded upon that concealment. It has also been distinctly held, that if one injures another by such fraud as the law recognizes, he is responsible although not interested in the transaction, and not himself gaining by the fraud; as, for example, when one knowingly gives false recommendations of a person seeking employment.—It may be proper to mention the doctrine of constructive fraud, or that by which the law treats as fraudulent certain acts which have, or which are adapted to have, the effect of fraud, although none be intended; as, for example, if one buys a chattel, and leaves it, however honestly, in the possession of the seller, this is a void sale as against a third party who buys of the seller not knowing the previous sale. This not taking away what one buys is held in some courts to be conclusive evidence of constructive fraud, and in others to be only what is called a badge of fraud, or a very suspicious circumstance indicating fraud, but open to explanation. (See SALE.)

FRAUDS, STATUTE OF. This is a very peculiar law, and in its extent and systematic form is quite unknown out of the British empire and the United States. It originated, nearly two centuries ago, in the earnest desire of eminent English jurists to prevent the numerous frauds which were perpetrated by means of suborned and perjured witnesses; and it was thought that the more effectual way of doing this would be a provision that a large number of the most common contracts should be incapable of legal enforcement unless they were reduced to writing and signed by the party whom it was sought to charge. For this purpose, in the 29th year of Charles II. (1678), the "statute for the prevention of frauds and perjuries" was enacted; and it is commonly known by the shorter name of the "statute of frauds." It has been doubted by wise lawyers and judges, from the time it was enacted to the present, whether this statute has not caused and protected as many frauds as it has prevented. But the same reasons which led to its enactment have always produced a prevailing belief that it was on the whole a useful statute. Hence, its provisions have been enacted more or less entirely, or declared to be law by adoption, in nearly if not quite all the states of the Union. In no one of them is the English statute verbally copied; and perhaps the provisions are not precisely the same in any two states. But they all copy parts of the original statute, and most of them enact its most material parts; and the difference between the enactments of different states is, generally speaking, not important. The reason why the statute has been deemed by so many useless, or worse, is, that it has been found impossible to make all its provisions, or even its more important ones, universally known. Hence, while by its requirement of written evidence it tends strongly to suppress that large class of frauds which was founded upon mere perjury, it tends also to expose innocent parties to grievous fraud through their ignorance of this requirement. They make, and perhaps carefully, important bargains, with all the details well adjusted; but they do not take the precaution to have their agreements reduced to writing and verified by the signature of the parties; and after complying with their part of the bargain in good faith, they learn for the first time in court, or from their counsel, that their bargain gives them no legal right nor remedy, because of the omission of that which they had never supposed to be requisite. We shall proceed to give the most general rules in regard to the provisions of this statute (meaning thereby both those which are most widely adopted, and those of the most important and frequent application) which have been sanctioned by the jurisprudence of the United States; without, however, attempting to go into a close consideration of the details and diversities of state enactment or adjudication, which would be inappropriate in a work like this, and impossible within the space which can be given to this subject.—By the 4th section of the English statute, which is the one that our statutes copy most frequently, no action can be brought upon an agreement not reduced to writing and signed by the party to be charged therewith, or by some person by him authorized, if by the action: 1, any executor or administrator is to be charged to answer damages for the deceased out of his own estate; 2, or if any person is to answer for the debt, default, or miscarriage of another; 3, or upon any agreement in consideration of marriage; 4, or upon any contract for the sale of lands, or any interest in or concerning them; 5,

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or any agreement not to be performed within one year from the making thereof. In reference to all these, it is held that a signing is sufficient if substantial, although not literal and formal. Thus, if in a letter signed by the party, he alludes to and recognizes the agreement; so if the party writes his name at the beginning or in any part of the agreement, with the intention that it shall verify the instrument as his own; or if a broker, for both parties or either party, writes their or his name in his book, they or he assenting. But where, as in some of our statutes, the word used is not "signed" but "subscribed," there it has been said, but may not be certain, that the name must be written at the bottom of the agreement. So the name may be printed, or written in pencil. An agent may sign, and may sign sufficiently although he write only his own name; and any ratification of his signature would be equivalent to a previous authority. But one of the contracting parties cannot sign as the agent of the other. An auctioneer or his clerk, or a broker, may be agent for either party or both; and his entry of the name of a seller or purchaser, at the time of the sale, satisfies the requirement of the statute, unless there be some agreement or condition to the contrary. The written agreement need not be in any precise or regular form, but must contain all the substantial elements of the bargain. In England, and in some of our states, as in New York, Maryland, and Georgia, it must recite the consideration of the contract. In others, as in Maine, Massachusetts, Mississippi, Tennessee, and Texas, if the promise be in writing and signed, the consideration may be proved by other evidence. The agreement may be contained in letters, and written on several pieces of paper, if they are such that they can be read together consistently with their purpose and character. And if a contract be severable in its own nature, and in some of its parts the statutory requirement is satisfied and in some not, the contract is still enforceable for those parts which comply with the statute. If a written contract be sued, it may be shown in defence that it has been altered. But if a plaintiff rests upon his written contract, but can maintain his action by it only by showing that it was orally altered, it is no longer the written contract on which he rests, and the action is defeated. Of the special clauses, the 2d, relating to a promise "to answer for the debt, default, or miscarriage of another," makes this statute cover all guarantees; and it is of great importance in respect to them. But it will be more convenient to state the law in this behalf under the title GUARANTEE. The 3d clause, which relates to promises "in consideration of marriage," is held not to apply to a promise or contract to marry, but to all promises of settlement, advancement, or other provision in view of marriage, and therefore all these must be in writing and signed. And it must be a promise to the other party; thus a promise of an advancement made to a daughter, in writing, not known to the intended husband until after the marriage, is not a promise to him, and cannot be enforced by him. The 4th clause relates to any promise or contract for "the sale of lands, tenements, or hereditaments, or any interest in or concerning them." The very broad scope of this phraseology has been considerably curtailed by adjudication. Thus, a contract for the sale of growing crops may be within the requirement of the statute or without it, according to circumstances. If the crop is already reaped, it is certainly severed from the land, and is of course a mere chattel; but even if it be still growing, if the intention of the parties be to reap it when grown and remove it at once from the land, this is not held to be a contract for a sale of an interest in lands; and the same rule was applied to a sale of mulberry trees in a nursery. While there is some uncertainty in the cases, we think the same rule of construction applies to growing grass, trees, or fruits, making writing unnecessary for the enforcement of a contract respecting them. A mere license to use land for some special purpose, as to stack hay, or leave a wagon on it for a short time, is not a bargain for an interest in lands. But a contract to convey lands for certain services is within the statute; and if it be not in writing, and the services be rendered, the party rendering them cannot enforce the contract or have the lands; but he may sue for the value of his services, and in determining that value, the value of the lands may be taken into consideration. The 5th clause relates to an agreement "that is not to be performed within one year from the making thereof." Here, the important principle has become well settled, that a contract or agreement is not within the statute, and therefore need not be in writing, if it be in reality and in good faith capable of a full and substantial performance within one year, unless extraordinary circumstances interfere to prevent it; and this principle is applied even where the parties themselves do not contemplate any performance of the contract within a year from the making of it. Thus, if one agrees to work for another "for one year," no time for the beginning of the service being fixed, he has a right to begin instantly, and then all his service will be rendered within the year, and the contract need not be in writing. It is important to remember, that if a contract which should have been in writing, but is not, is wholly performed on one side, and is such that nothing remains but the payment of the consideration money, there are many cases in which an action may be maintained in some form for the money due.—Another section (the 17th of the English statute) enacts that "no contract for the sale of any goods, wares, or merchandises, for the price of £10 or upward, shall be good, except the buyer shall accept part of the goods so sold and actually receive the same, or give something by way of earnest to bind the bargain, or in part payment," or that some note or memorandum be signed as

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before. This provision, in some form or other, is very common in the United States. The sum is variously fixed, in different states, at about $30 to $50, rarely less or more. The principal questions which have arisen under this clause are, what delivery and acceptance, or what earnest, or what part payment, will satisfy the statute, so as to make the writing unnecessary. In the first place, there must be both delivery and acceptance. A meets B, and they agree orally that A shall buy 100 bales of cotton which B has for sale, for $25,000. B sends the cotton forthwith to A's store. This, according to common law, completes the sale and B's right to demand the price. But, by the statute of frauds, if there be no note or memorandum in writing signed by A, he may instantly, and without assigning any reason, send all the cotton back to B. As to what is a delivery, it may be said, in general, that it is any transfer of possession and control, made by the seller, for the purpose and with the effect of putting the goods out of his hands and into the hands of the buyer. It may be an actual delivery; or it may be constructive, as by the delivery of the key of a warehouse, or making an entry in the books of the warehouse keeper, or the delivery of an endorsed bill of lading, or even pointing out as the buyer's own massy goods that are difficult of removal, as timber in a dock, or a large stack of hay. So a part may be delivered for the whole, and carry with it constructively the delivery of the whole. On the other hand, as to what constitutes acceptance, we must look mainly at the intention of the party; for if he so acts as to manifest his assent to the delivery, and his intention to accept and retain the goods, or so as to justify the seller in believing that the buyer so assents and intends, this will have the effect of fixing his liability for the price, whatever be the way in which he expresses this assent and intention. Hence, mere delay, or holding the goods for a considerable time in silence, is an assent and acceptance. But as he has a right to examine the goods and see whether he chooses to accept them, he must be allowed time enough for this purpose; and his silence during a period of time that is not more than sufficient for this is not evidence of acceptance. It has been much questioned whether the sale of shares or stocks in incorporated companies, as, for example, in corporations for manufacturing purposes, for railroads, and the like, is a sale of "goods, wares, and merchandises" within the meaning and operation of the statute. In England the prevailing authority is that these shares are not "goods, wares, or merchandises" within the statute, and therefore the bargain need not be in writing. Perhaps the prevailing rule in the United States is the other way. But the authorities are to some extent conflicting, and the question may not be considered as settled. As to giving any thing by way of earnest (the exact words of the English statute are "in earnest"), almost any thing which has an actual value, though a small one, may suffice. Thus, a dime, or even a cent, might be sufficient, but not a straw or a chip, though it were called "earnest money;" it would be safe, however, if earnest were relied upon as clinching the bargain (to use an old phrase), to give money of some real and considerable value. So, part payment has the same effect as earnest money; but it must be an actual part payment. Therefore, if the seller owes the buyer, and it is a part of the bargain that the debt shall be discharged and be considered as a part of the price to be paid, the contract must nevertheless be in writing, because this is not a part payment within the meaning and requirement of the statute. If, however, the debt were certainly and irrevocably discharged, as by the giving up of a note of hand, the decision might be otherwise. The difficult question has been much considered, whether a bargain that A should make and sell a certain article to B, is a contract for the sale of the thing, which must be in writing, or a mere bargain whereby B hires A to work for him in a certain way, which need not be in writing. Perhaps no better rule or principle for deciding this question can be found than the following. A contract to buy a thing presently, which the seller has not now, is just as much within the requirement of the statute as a bargain for a present sale; and if by the bargain the seller may himself buy, or make, or procure in any way he likes, the things he agrees to sell, this is only a contract for the sale of the goods, and must be in writing. But if the seller, and he alone, is, by the bargain, to manufacture these, and in a certain way and of certain materials, or after a certain model, or if in any way it appears that the seller is to make certain things and charge therefor a price for his labor, skill, and material, although all these are included in the mere sale price of the article, then it is a contract for the manufacture of the goods, and not merely a contract for their sale, and it need not be in writing. The statute itself, both in England and the United States, speaks of part payment only; but courts of equity, both there and here, have strongly inclined to the rule, that part performance of any of the contracts within the statute of frauds shall have the same effect that part payment has upon a contract of sale by the statute. There has been some doubt expressed as to the expediency of the rule; but it may now be considered as settled, that courts of equity, or courts of law having equity powers (as most American courts of law now have), will enforce an oral contract which should have been in writing, provided there has been an actual and substantial part performance of it by the party sought to be charged. —There are other sections in the English statute, and in some of our American statutes of frauds, or statutes for analogous purposes, which prescribe in what way WILLS must be made, others which relate to TRUSTS; and others to LEASES, which will be considered under those titles.

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FRAUNHOFER, Joseph von, a German optician, born in Straubing, Bavaria, March 6, 1787, died June 7, 1826. The son of a glazier, he exercised in boyhood the trade of his father. He received little education, studied the laws of optics in the intervals of labor, and in 1806 was taken as optician into an establishment for the manufacture of mathematical instruments. He gradually made himself familiar with astronomy and mathematics, and united with Reichenbach and Utzschneider in founding at Benedict-Beurn an establishment for the fabrication of dioptric instruments, which was transferred to Munich in 1819. He manufactured the finest crown glass, much superior to the English, for achromatic telescopes and prisms, and invented a machine for polishing surfaces in parabolic segments, a heliometer, microscope, and the celebrated parallactic telescope of the observatory of Dorpat. By using fine prisms that were free from veins he discovered about 590 black lines crossing the solar spectrum, and projected the most important of these in a drawing of the spectrum. Similar lines he found in the spectra of the moon and of some of the planets and fixed stars, but none in artificial white light. Upon his tomb is the inscription: *Approximavit sidera.*

FRAYSSINOUS, Denis Luc, count, a French prelate, born in Curières, department of Aveyron, May 9, 1765, died in St. Géniez, Dec. 12, 1841. He studied theology in the Sulpician seminary of Laon at Paris, was admitted to orders in 1789, disappeared during the revolutionary persecution, and began at Paris in 1803 the conferences upon the proofs of Christianity which were the basis of his reputation. His eloquence and genius attracted the cultivated youth of the capital, and operated effectively against the reigning philosophy. When in 1809 the French empire came into collision with the holy see, his conferences were interrupted, and in 1811 he retired to Aveyron, and returned only with the Bourbons. In Oct. 1814, he resumed his conferences, and was made successively royal preacher, bishop of Hermopolis *in partibus*, grand master of the university (1822), member of the French academy, peer of France, and minister of ecclesiastical affairs (1824). He recalled the Jesuits into the schools and churches. In 1830 he was intrusted by Charles X. with the education of the duke of Bordeaux, whom he soon after accompanied into exile. He returned to France in 1838, after which he lived in retirement. His principal works are funeral orations on the prince of Condé, Cardinal Talleyrand, and Louis XVIII.; a treatise on the "True Principles of the Liberty of the Gallican Church;" and a collection of his conferences under the title of a "Defence of Christianity."

FRECKLE (*lentigo, ephelis lentiformis*). True freckle is characterized by the presence of small round yellow spots, never larger than a lentil, scattered chiefly over the face, neck, chest, and hands. It is commonly constitutional, appearing in childhood and lasting during life. Sometimes it seems caused by exposure to the sun, and in this case the spots may disappear with the removal of the cause; the subjects of it are commonly of light complexion. Freckle is unattended with itching or pain, and is a blemish rather than a disease. Treatment has very little influence over it. Mr. Wilson ("Diseases of the Skin") recommends a lotion containing 5 grains of corrosive sublimate of mercury to half a pint of bitter almond emulsion.

FREDEGONDA, a Frankish queen, the rival of the famous Brunehaut, born about 545, died in 596. Her beauty having attracted the attention of Chilperic I., king of Neustria, she became his concubine. She contrived by a trick the repudiation of the queen, Andovera, but was disappointed in her scheme by the second marriage of Chilperic with Galsuinda, a Visigoth princess and sister of Brunehaut, or Brunehilde, who had been married to his brother Siegbert, king of Austrasia. Attributing this marriage to the influence of the Austrasian queen, Fredegonda vowed deadly hatred to both sisters. She removed Galsuinda by assassination, became her successor, and brought about a war of the two brothers, in which Siegbert was victorious, but soon fell through the hands of her assassins (575). Brunehaut, who became her captive, escaped death and returned to her own country; but Meroveus, the son of Chilperic by his first wife, who had been secretly married to her, fell a victim to the revenge of his stepmother. A series of atrocious crimes followed. Pretextatus was treacherously murdered; Clovis, the brother of Meroveus, was executed on the false accusation of having caused the death of Fredegonda's 3 children, who were carried away by an epidemic; the mother of the princes was strangled, their sister outraged and confined in a convent. Finally, she contrived the assassination of her husband, and assumed the government in the name of her son Clotaire. She now successfully resumed the war against Austrasia, and remained in power till her death.

FREDERIC. I. A N. co. of Md., bordering on Penn., and separated from Va. on the S. W. by the Potomac river; area, about 770 sq. m.; pop. in 1850, 40,987, of whom 3,913 were slaves. A branch of the Blue Ridge of Virginia, called South mountain, runs along its western border, but most of the land in the central and eastern parts is undulating. The soil is fertile and well watered by the Monocacy river, Cotoctin, Pipe, Linganore, and Bennett's creeks. It consists of decomposed limestone or slate, producing abundantly the various kinds of grain, potatoes, and pasturage. In 1850 it yielded more butter and hay than any other county in the state, and more wheat than any except Washington. The productions that year amounted to 731,864 bushels of wheat, 782,603 of Indian corn, 180,922 of oats, 23,838 tons of hay, and 723,064 lbs. of butter. There were a great number of mills and factories, 79 churches, 7 newspaper offices, and 5,182 pupils attending public schools. Copper, iron, manganese, excellent limestone,

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and fine white marble are among the most valuable mineral products. Facilities for transportation from the interior are numerous, as the county is traversed by the Baltimore and Ohio railroad, and has on its S. W. border the Potomac river and the Ohio and Chesapeake canal. Capital, Frederic City. II. A N. E. co. of Va., abounding in magnificent mountain scenery; area, 378 sq. m.; pop. in 1850, 15,975, of whom 2,294 were slaves. It occupies part of the great valley of Virginia, is highly productive, well cultivated, and in all respects one of the richest portions of the state. Two or three small affluents of the Potomac supply it with good water power. The staples are grain, butter, and live stock; in 1850 the productions amounted to 311,060 bushels of wheat, 199, 242 of Indian corn, 50,701 of oats, 6,433 tons of hay, and 193,394 lbs. of butter. There were 73 mills, 11 factories, 1 iron furnace, 1 foundery, 7 tanneries, 31 churches, and 360 pupils attending public schools. Blue limestone is abundant. A railroad extends from Harper's Ferry to Winchester, the capital, and turnpike roads intersect the county in all directions. Value of real estate in 1856, $5,742,751.

FREDERIC CITY, the capital of Frederic co., Md., situated on Carroll's creek, 2 m. from its mouth in Monocacy river, and 60 m. W. of Baltimore; pop. in 1850, 6,028. A branch railroad 3 m. long connects it with the Baltimore and Ohio railroad. It is a well built city, with wide regular streets, lined with houses of brick or stone. It contained in 1850 a handsome court house, a gaol, 12 churches, 3 banks, an insurance office, various scientific and literary institutes, 5 newspaper offices, 3 founderies and machine shops, a fulling mill, a woollen factory, 2 rope factories, 13 corn and flour mills, 8 saw mills, a paper mill, and several other manufactories. It is the seat of a college with 90 students, under the charge of the Jesuits, of a house for novices of the same order, and of a convent and academy of the Visitation nuns. Its trade is extensive, and the surrounding country is remarkably productive.

FREDERIC, the name of several monarchs and princes, arranged below under their respective countries in the following order: Bohemia, Denmark, Germany, Prussia (including Brandenburg), Saxony, and Würtemberg.

I. BOHEMIA.

FREDERIC, elector palatine (V.) and king of Bohemia, born in Amberg in 1596, died in Mentz, Nov. 19, 1632. He was the son of the elector Frederic IV., and, by his mother, grandson of William I. of Orange. He received a careful education, succeeded his father in the palatinate in 1610 as a minor, married Elizabeth, daughter of James I. of England, became the leader of the Protestant union, and in the 2d year of the 30 years' war (1619) was elected king of Bohemia by the revolted people. Induced by his ambitious wife, who preferred "*sauerkraut* with a king to roast beef with an elector," he accepted the regal crown, which he soon after lost, through the battle of Prague (Nov. 8, 1620) rapidly won by his cousin Maximilian of Bavaria, the head of the Catholic league. Leaving the crown, the insignia, and the charter of Bohemia, Frederic hastily escaped to Holland, and lived in exile, under the ban of the empire and persecuted by ridicule, till his death.

II. DENMARK.

FREDERIC VI., king of Denmark, son of Christian VII. and the princess Caroline Matilda, born Jan. 28, 1768, died Dec. 3, 1839. He was declared regent at the age of 16. His education had been much neglected, but he remedied this misfortune by great natural intelligence, firmness of purpose, and a capacity for observation. With the help of his minister Count Bernstorff he applied himself to the abolition of feudal serfdom, the reformation of the criminal code, the breaking up of monopolies, the establishment of a better financial system, and the prohibition, earlier than any other government, of the slave trade. March 16, 1792, was the date of the edict against the slave trade, providing for its enforcement on and after Jan. 1, 1804. In 1797 Bernstorff died; he had recommended to the regent to observe a strict neutrality in the wars of the epoch, but this soon became impossible. In 1797 the Danish admiral Steen Bille gained a complete victory over the Tripolitans, who had for some time disturbed the trade of the Mediterranean; and in 1800 the regent concluded a convention with England, whose claim of right to search Danish merchantmen for goods contraband of war had led to much recrimination, and even some acts of open hostility. But in Dec. 1800, Denmark having signed the maritime confederacy with Russia, Sweden, and Prussia, on terms similar to the armed neutrality of 1780, the flames of war broke out afresh. Every Danish vessel in English ports was seized on Jan. 14, 1801. On March 20, Sir Hyde Parker, with Nelson second in command, entered the Cattegat with a fleet of 47 vessels, 18 of which were line-of-battle ships. The regent was summoned to withdraw from the neutral convention, and to open his ports to the English. The demand was rejected, and a furious engagement followed, in which the Danish fleet was almost annihilated. An armistice was now concluded for 14 weeks, during which Denmark consented to withdraw from the maritime confederacy, and this led to a peace, when the confederacy was broken up by the assassination of the czar Paul, June 24, 1801. Frederic, however, persisted in the policy of neutrality, and on Aug. 8, 1807, a British fleet again passed the strait at Elsinore, and appeared off Copenhagen. The prince was summoned to an alliance with England, to surrender his fleet, his capital, and his castle at Elsinore. The British envoy assured him that Denmark should lose nothing, and that his new allies, the English garrisons, would pay for every thing they needed. Upon his refusal, the capital was bombarded for 3

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days (Sept. 2–5). A capitulation was then made, the fleet was transferred to a British admiral, the arsenal and docks were destroyed, and every ship and boat, as well as every available piece of timber, rope, or shipwright's tool, were carried off to England. Denmark threw herself at once into the arms of France, and sent forth a fleet of privateers which preyed incessantly upon British commerce. The father of the Danish regent, the unhappy Christian VII., died March 12, 1808, and Frederic ascended the throne. He had been married in 1790 to the daughter of the landgrave of Hesse-Cassel. On Dec. 10, 1809, Sweden signed away Finland to Russia; and in the course of the following month, a treaty was concluded by Denmark with Sweden which was designed to reëstablish the good relations of the two countries. Both were exhausted by the wars of their great neighbors, and both soon became subject to the imperious rule of Napoleon. Denmark remained his most faithful ally, and suffered accordingly. In 1814 she was robbed of Norway, in exchange for which she received Pomerania, which she afterward ceded to Prussia. Frederic was at last compelled to send 10,000 men to the allied army against the French emperor. The state had become bankrupt in 1813. The peace brought with it an immense fall in the price of provisions; and real estate remained at a great depreciation of value as late as 1826. The wisdom and devotion of the king gradually brought about improvement in general affairs. A national bank was reëstablished. The farmers were allowed to pay their taxes in kind. Order was restored to the finances, and confidence returned. The last part of Frederic's reign is remarkable for the establishment of a representative council as a popular branch of the government (May 28, 1831), which was received by his subjects with every demonstration of joy.

FREDERIC VII., king of Denmark, son and successor of Christian VIII., born in Copenhagen, Oct. 6, 1808, ascended the throne Jan. 20, 1848. His mother was the princess Charlotte Frederica, of Mecklenburg-Schwerin. From 1826 to 1828 he travelled in various parts of Europe, and studied in Geneva. He was married Nov. 1, 1828, to the princess Wilhelmina Maria of Denmark, whom he divorced in 1837, and in the same year he was removed by royal order to Fredericia in Jutland. His exile ended with his father's accession to the throne in 1839. In June, 1841, he was married to the princess Caroline Charlotte Marianne of Mecklenburg-Strelitz, whom he also put away in Sept. 1846; and in Aug. 1850, he contracted a morganatic marriage with a milliner of Copenhagen whom he had created Countess Danner in 1848. The principal events of his reign are the revolt of Schleswig-Holstein in 1848 and the abolition of the Sound dues in 1857, for an account of which see DENMARK. Frederic has no children, and the heir presumptive is his uncle, Prince Ferdinand, who is also childless.

III. GERMANY.

FREDERIC I., emperor of Germany, surnamed Barbarossa (Redbeard), son of Duke Frederic II. of Swabia, and Judith, daughter of Henry the Black, duke of Bavaria, born in 1121, drowned June 10, 1190. His uncle, Conrad III., the first German emperor of the house of Swabia (Hohenstauffen), had so entirely won the confidence of the princes and nobles of both Italy and Germany, that upon his recommendation Frederic, then duke of Swabia, was unanimously elected his successor (1152). His elevation was received throughout Europe with marked satisfaction. After reducing several revolted Italian cities and receiving the crown of Italy at Pavia, he went to Rome, reëstablished the pope's supremacy there, which had been shaken by Arnold of Brescia, and was crowned emperor, but not until the pope (Adrian IV.) had obliged him to perform several humiliating ceremonies which Frederic was afterward enraged to learn that the Romans regarded as acts of temporal vassalage. His next care was to pacify the empire by settling the disputes between the archbishop of Mentz and the count palatine of the Rhine, and the difficulties concerning the duchy of Bavaria. He reduced Boleslas of Poland to vassalage, and in 6 years had restored the empire to the prosperity which it enjoyed under Henry III. He now turned his attention again to Italy, where the smaller towns were groaning under the oppression of Milan, and in 1158 he appeared before the latter city with 115,000 troops and forced it to submission. It soon rebelled again, and its fortifications were destroyed and its inhabitants exiled. Meanwhile Pope Adrian had died (1159), and Alexander III. been chosen to succeed him. Frederic, however, supported an antipope, Victor IV., and Alexander was forced to take refuge in France. Victor died in 1164, and the emperor thereupon set up another antipope, who took the title of Pascal III., and crowned the emperor and his consort a second time in the church of St. Peter at Rome in 1167. The Lombard cities, which had formed a powerful league against Frederic, next awakened the imperial resentment, but a terrible pestilence which broke out in his army dissipated all his plans and forced him to return to Germany in disguise, with only a few followers. The cities of Lombardy now consolidated their league. The defences of Milan were restored, and a new city sprang up in a beautiful and naturally fortified spot, which in honor of the pope and in defiance of the emperor was called Alexandria or Alessandria. During this time Frederic was busily engaged in regulating the affairs of Germany, adjusting internal troubles, settling the contests in the north between Henry the Lion, duke of Saxony and Bavaria, and his adversaries, and strengthening his own power. After nearly 7 years passed at home, he prepared once more to enter Italy. In the autumn of 1174 he invested Alessandria, but after a siege of 7 months, during which

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his army suffered greatly from sickness and fatigue, and a fruitless assault, he drew off his forces and opened negotiations with the Lombards who had come to the relief of the city. The deliberations however were soon broken off, and on May 29, 1176, a decisive battle was fought near Legnano, in the vicinity of the lake of Como, in which Frederic was defeated with great loss, and was supposed for some days to have been killed. He reappeared at Pavia, where the empress had already put on mourning. He now acknowledged Alexander as pope, the ban of excommunication under which he had lain for 10 years was taken off, and in July, 1177, an interview took place at Venice, between the pontiff, the emperor, and several other potentates, in which a complete reconciliation was effected. Frederic humbled himself again at the pope's feet, and received from him the kiss of peace, at which the Germans exclaimed: "Lord God, we praise thee!" The cities of Lombardy obtained a truce for 6 years. The war had lasted 20 years. New troubles were now raised in Germany by the ambitious duke Henry the Lion. He was finally subdued, however, and banished for 3 years to England, where, having previously married Matilda, the daughter of the English king Henry II., he became the founder of the royal family of Brunswick. The Lombard truce was followed in 1183 by a definitive treaty of peace on terms honorable to all parties, and when Frederic made a journey to Italy soon afterward he was received by his old enemies with the wildest acclamations of joy. Tranquillity reigned in all his dominions when the news of the fall of Jerusalem in 1187 caused Pope Clement III. to proclaim the 3d crusade. The old emperor took the cross, and in the spring of 1189 put himself at the head of 150,000 warriors, crossed Hungary, severely punished the Greeks, whom he suspected of treasonable designs, penetrated into Asia Minor, defeated the Moslems in several engagements, and took Iconium (Konieh). The army reached the banks of the Seleph or Calycadnus, June 10, 1190. The vanguard had crossed by a bridge, when the emperor, impatient to join his son, Duke Frederic of Swabia, who led the advance, plunged with his war horse and heavy armor into the stream, was overpowered by the current, and was borne away. His dead body was recovered and buried by his son. Some historians have preferred a less well authenticated account that he lost his life in consequence of bathing in the Cydnus. Frederic was a man of noble and magnanimous qualities, of great mental endowments, and of spirit equal alike in reverses and prosperity, though somewhat arrogant and occasionally cruel in the heat of war. He was a patron of letters and a man of learned accomplishments, and all these advantages were moreover enhanced by remarkable elegance and majesty of aspect. After divorcing his first wife (1156), he was married to Beatrice of Burgundy. His son Frederic, founder of the Tentonic knights, lost his life in the 3d crusade, and another son, Henry VI., succeeded to the empire.

FREDERIC II., a German emperor of the house of Hohenstauffen, and king of Naples and Sicily, son of Henry VI. and Constantia of Sicily, born at Jesi, near Ancona, Dec. 26, 1194, died in Fiorenzola, Dec. 12, 1250. He was educated with great care by his mother under the guardianship of Pope Innocent III., acquired an extensive knowledge of ancient and modern languages, as well as of different sciences, including philosophy, which he learned from a Saracen teacher, and poetry, which he cultivated himself, and soon developed those chivalric and royal talents, that active, energetic, and buoyant spirit which made him one of the most distinguished monarchs of the middle ages. He was hereditary duke of Swabia and other dominions in Germany, but for his investiture and coronation as king of Naples and Sicily his mother sacrificed to Innocent III. (1209) some of the most essential rights of the state. His uncle, Philip of Swabia, who disputed the throne of Germany after the death of Henry VI. with Otho IV., having fallen in a battle, Frederic was assisted by the pope to reëstablish the imperial dignity of his house. He repaired to Germany in 1212, was joyfully received by the Ghibellines, compelled Otho to retire, was crowned at Aix la Chapelle in 1215, and generally acknowledged in 1218. Leaving his son Henry, whom he caused to be declared king of the Romans, in Germany, he started in 1220 for Italy, hastened to Rome, where he was crowned as emperor, and thence to his hereditary kingdom, whose affairs he arranged while preparing for a crusade, according to a solemn promise given to the see of Rome. Men of science, poets, and artists flocked to his court, the university of Naples was founded, the medical school of Salerno became flourishing, collections of art were procured, and Peter de Vinea prepared an extensive code of laws to suit all the classes and nations of Germany and Italy, which Frederic, no less ambitious than his grandfather Barbarossa, was scheming to unite into one hereditary empire. These schemes, however, were checked by the independent spirit of the Lombard cities, which refused to send their representatives to the proposed diet of Cremona, reëstablished their league under the lead of Milan and barred the passages of the Alps, and still more by the antagonistic exertions of the popes Honorius III. and Gregory IX., who finally compelled the emperor to start upon his long delayed crusade (1227). But a pestilential disease which broke out on board the fleet obliged him to land at Otranto; the expedition only reached the Morea, and Gregory IX., boldly pursuing the policy of Gregory VII., punished the emperor with excommunication and interdict. It was in vain that Frederic started again the next year, reached the Holy Land, and fought successfully against the Mussulmans; the policy of the pope, who declared him unworthy before absolution

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to battle for the cross, roused against him the patriarch of Jerusalem and the 3 orders of knights in the East, and also produced the usurpation of his father-in-law, John of Brienne, titular king of Jerusalem, in the Italian kingdom. Having concluded a truce of 10 years with the sultan of Egypt, which brought into his possession the holy cities and the whole coast of Judea, he returned as crowned king of Jerusalem, reconquered his kingdom, defeated the intrigues of his enemies, and finally gained his absolution (1230). The Lombard cities, however, still maintained their league, being now supported by the rebellion of Henry, the son of the emperor. Frederic returned to Germany after an absence of 15 years, restored his imperial dignity, and pardoned his son. But a new rebellion drew upon the prince the punishment of imprisonment for life, in the 7th year of which he died. His younger brother Conrad was made king of the Romans in his stead, and Frederic marched against the Lombards, and defeated them at Cortenuova (Nov. 26–27, 1237); all the cities surrendered except Milan, Brescia, Piacenza, and Bologna, whose resistance was again encouraged by Gregory IX. Irritated by Frederic's having made his natural son Enzio king of Sardinia, the pope again excommunicated the emperor on Palm Sunday, 1239. Frederic marched against Rome, took Ravenna (1241), but paused to listen to a proposal that the feud should be decided by an assembly of bishops. Soon, however, changing his mind, he had the Genoese fleet, which was conveying 100 prelates to Rome, intercepted by Enzio. Gregory IX. did not long survive these reverses. The short papacy of Celestine IV. and a long interregnum followed, which was terminated by the election of Innocent IV. The new pope, once the friend of the emperor, became his bitterest enemy, confirmed his excommunication, fled to Lyons in France, where he convoked a council, cited Frederic before this tribunal, rejected his defender Thaddeus of Suessa, declared the throne of Germany vacant, and subsequently recognized two new emperors, Henry Raspe of Thuringia, who was defeated by Conrad, and William of Holland. The old emperor was now deserted by many of his allies, and lost a battle before Parma, and another near Bologna, in which Enzio was made prisoner. He even became convinced that his old friend Peter de Vinea had treacherously attempted to poison him, for which Peter was sent to prison, where he killed himself by dashing his head against the wall. In spite of all these disasters Frederic continued the struggle until he died.

FREDERIC III., surnamed the Pacific, emperor of Germany (IV. as king of Germany, V. as archduke of Austria), son of Duke Ernest of Styria, and a Polish princess, born in Innspruck, Sept. 21, 1415, died in Lintz, Aug. 19, 1493. Having begun his reign over Styria, Carinthia, and Carniola, together with his brother Albert the Prodigal, in 1435, he became, after the death of the emperor Albert II. (1439), guardian of his son Ladislas the Posthumous, and was unanimously elected king of Germany (1440). Being of an exceedingly cautious and peaceful disposition, he accepted this burdensome dignity only after 11 weeks' hesitation, and was crowned at Aix la Chapelle in 1442. Possessed of many private virtues, he was nevertheless inadequate to the task of ruling the German empire in that period of anarchical turbulence, or even of defending the interests of his house, though these were much dearer to his heart than the interests of the empire, against the attacks of the warlike and ambitious Matthias Corvinus, king of Hungary, George Podiebrad of Bohemia, and Charles the Bold of Burgundy. The only weapon he seems to have wielded with dexterity was diplomacy, but this, too, served only the private purposes of the house of Austria, of which he may be regarded as the second founder, in spite of his indolence. Wars, however, in which his part was generally passive, filled nearly the whole reign of this peace-loving monarch, which was the longest of any German emperor's, lasting for 53 years. His brother Albert, duke of Upper Austria, repeatedly attacked him; the Hungarians under John Hunyady invaded Austria (1445–'52); the Armagnacs, whom the emperor had called to aid him against the Swiss, committed depredations (1445); Matthias Corvinus and George Podiebrad defeated the imperial forces; the Turks ravaged Carniola (1469); hostilities broke out with Charles the Bold of Burgundy, and a war was carried on in the Netherlands, which Maximilian, the son of Frederic, had received after the death of Charles the Bold (1477) with the hand of his daughter Mary, and where he was made captive in 1488. Frederic was also humiliated by the usurpation of Sforza at Milan (1447), after the death of the last Visconti; by the Swiss, who routed the Armagnacs, and compelled him to an unfavorable treaty (1449); in the quarrel of the succession of the palatinate (1449), which threatened to cost him his throne; by continual lawlessness in Germany, where he was even once cited before the secret tribunal of the *Vehme;* and by the successive encroachments of the popes, particularly of Pius II. (once his secretary as Æneas Sylvius). His chief efforts to avert the invasion of the Turks were a journey to Rome for a conference with the pope (1468), and the convening of a diet at Ratisbon (1471), both without result. His last years were cheered by the successes of his son Maximilian, whom he had made king of Rome (1486), and finally intrusted with all the cares of his dominion (1490), himself retiring to Lintz, where he was engaged in his favorite studies of astrology, alchemy, and botany till the end of his life. He was the last king of Germany who was crowned emperor of Rome and king of the Lombards. Having inherited Lower Austria on the death of Ladislas, and Upper Austria on that of his brother Albert, he raised these united provinces to the dignity of an archduchy. The crown of

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Germany became nearly hereditary in his house, the next successor being his son Maximilian I. His device is said to have been *A. E. I. O. U.: Austriæ est imperare orbi universo.*

FREDERIC III., king of Germany. See LOUIS THE BAVARIAN.

IV. PRUSSIA.

FREDERIC WILLIAM, elector of Brandenburg, usually styled the Great Elector, and the founder of the Prussian monarchy, born in 1620, died in Potsdam, April 29, 1688. He came to the electoral power at the age of 20 (1640), on the death of his father, George William, the 10th elector. The father had been a feeble prince, with a traitorous minister. His estates had been continually ravaged by Swedes and imperialists during the first 22 of the 30 years' war. The cities lay almost in ruins, the villages for the most part burned and depopulated, and a part of his paternal inheritance had been confiscated by the Swedes. The young prince began his reign by dismissing his father's unworthy council, by regulating his finances, and by negotiating with so much address as to regain his lost provinces, which were guaranteed to him by the peace of Westphalia 8 years later. A year after his accession he concluded a treaty of neutrality with the Swedish queen Christina, and 3 years after, by an armistice with Hesse-Cassel, the strong outpost city of Cleves and the county of Mark in Westphalia were added to his dominions. The treaty of Westphalia was concluded in 1648, when the elector, who had just claims to the whole of Pomerania, received but the eastern portion of that country; but as an indemnification for the loss of the western division and the island of Rügen, he obtained the county of Hohenstein, the bishoprics of Minden, Halberstadt, and Kamin, as lay principalities, and the reversion of the archbishopric of Magdeburg. He had withdrawn from the war in great part 7 years before, but his army was much improved. He formed an alliance with Charles X. of Sweden in 1655 against Poland. The sequel was the fall of Warsaw, and Frederic's achievement of the independence of his Prussian duchy, formerly under enfeoffment to Poland. Louis XIV. at this time was pursuing with persevering ambition his project of a Rhine frontier, and the conquest of the Spanish Netherlands. He seized a line of frontier towns, and invaded Holland (1672). One only of the German princes, the elector of Brandenburg, seemed conscious of the danger, and after arming his exposed Westphalian dominions he appealed successfully to the emperor Leopold of Austria, to Denmark, to Hesse-Cassel, and other German states. A joint army was placed under the command of an imperial general; but the Austrian coöperation was crippled through the machinations of Leopold's privy councillor, Lobkowitz, who became a creature of the French ministers. Frederic William was compelled thus to come to terms with France, with the loss of Wesel and Rees (1673). Immediately after this event, Austria resuming operations against the French, the elector again took up arms, and Louis, in order to furnish occupation for the electoral forces in their own country, engaged the king of Sweden to advance upon Berlin. The Swedes accordingly entered Brandenburg by a rapid forced march. Frederic arrived suddenly from the Rhine at Magdeburg, and hurrying across the Elbe at the head of his cavalry (but 6,000 in number), surprised the Swedes at Fehrbellin. His infantry (11,000) were many miles in the rear, but he attacked the enemy without delay, June 28, 1675. The rout was complete. Frederic pursued the flying enemy into Pomerania, and reduced the greater portion of the province. By a treaty of peace (June 29, 1679) the elector restored nearly all his conquests, and received from France 300,000 crowns. He now devoted himself to the prosperity of his dominions, and the extension of their area. He founded universities, welcomed over 20,000 Protestant exiles, whom Louis XIV. banished from France, and made it the aim of his life to oppose French aggression, and to protect the liberties of Germany.

FREDERIC I., 1st king of Prussia, born in Königsberg, July 22, 1657, died Feb. 25, 1713. He was the son of Frederic William, the great elector, whose heir apparent he became on the death of his elder brother. Deformed by having been dropped when a child from the arms of his nurse, and of weak constitution, his education was neglected, and thus his stepmother could the more easily persuade the old elector to bequeath in his will a part of his possessions to her children. But Frederic, who was no less ambitious than his father, and was assured of the favor of the emperor Leopold I., took, on his accession as elector in 1688, under the name of Frederic III., immediate possession of the whole inheritance, declaring the will null, and satisfying his stepbrothers with offices and pensions. While vying in brilliancy with the court of Louis XIV., he also strenuously pursued the policy of aggrandizement so successfully carried on by his father. Seeking the alliance of influential princes, he lent several of them his troops, on condition of mutual support or payment in money. Thus 6,000 of his soldiers aided William of Orange to secure the throne of England, and fought in the great battle of the Boyne; 20,000 fought successfully against the French, who had ravaged the Palatinate (1689); 15,000 joined the quadruple alliance of the Empire, Spain, Holland, and England, and fought on the Rhine (1690); 6,000 were sent (1691) to assist the emperor in his Hungarian war against the Turks, and contributed to the victories of Zalánkemén, Belgrade, and Zentha. But all these services procured Frederic in the peace of Ryswick (1697) politically only the confirmation of the stipulations granted to his father by the treaties of Westphalia and St. Germain. Private negotiations, however, with several reigning houses, founded on exchanges, purchases, and promises, gave him in part the immediate possession of, in part hereditary

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claims to, various territories, which greatly enlarged the limits of his dominions. The chief object of his ambition, the royal crown, had still to be gained. This was finally accomplished after long negotiations by a treaty with the emperor, concluded Nov. 16, 1700, and based on the humiliating obligation to aid the emperor with 10,000 troops in the threatening war of the Spanish succession, to support the house of Austria in every debate in the diet, and to vote for its princes at every imperial election. Hastening to Königsberg in the midst of winter, Frederic and his wife, the sister of George I. of England, were crowned with the greatest splendor, Jan. 18, 1701. On this occasion he founded the order of the black eagle. Prussia was soon acknowledged as a kingdom by most of the states of Europe; by Spain and France in the treaty of Utrecht; the pope, the republic of Poland, and the Teutonic order, were the last to recognize it. In the wars of Charles XII. of Sweden Frederic took no part, being actively engaged in the support of his ally the emperor in the long struggle against Louis XIV. He sent to the army on the Danube 20,000 men, who took part in the battle of Blenheim (1704), and to Italy 6,000, who greatly contributed to Eugene's victory at Turin (1706). When he died the war was not terminated, though in its chief point long before decided in favor of the French pretender to the Spanish succession. Frederic is praised for his natural kindness, love of his subjects, and loyalty to his allies; but his vanity, love of pomp, and extravagance, which led to ruinous extortions, deserve unmitigated blame. He founded the university of Halle, the Berlin academies of science and of sculpture and painting, and the supreme court of appeal. Like his father he was a consistent defender of the interests of Protestantism in Germany.

FREDERIC WILLIAM I., the 2d king of Prussia, son of Frederic I. and Elizabeth, a princess of Hesse-Cassel, born in 1688, died May 31, 1740. The new monarchy (dating from 1701) had been ungraciously recognized by the crowned heads of Europe, and the crown prince early conceived the design of making for Prussia a conspicuous place among the powers by means of an army. He ascended the throne Feb. 25, 1713, and by strict economy was enabled to maintain a peace establishment of 60,000, and at length of 72,000 men, being $\frac{1}{2}\frac{1}{3}$ part of his subjects. The ruling mania of his life was to form a corps of giant soldiers; and for this purpose his envoys ransacked the world. An Irish recruit measuring 7 feet was induced to enlist by a bounty paid in cash equivalent to $6,200, a sum much greater than the year's salary of the Prussian ambassador who found him in the streets of London. During a reign of 27 years Frederic preserved uninterrupted peace for Prussia, with the exception of a short misunderstanding with Charles XII., and a little idle soldiering under Prince Eugene. In 1713 he had concluded with Sweden, during Charles's absence in Turkey, a treaty, the object of which was to preserve Swedish Pomerania from Russia and Saxony. In consideration of 400,000 thalers, Frederic received the cities of Stettin and Wismar, and was to mediate between the belligerents. Charles, returning subsequently from Turkey, insisted on the restoration of Stettin, but refused to refund the money. Frederic promptly declared war, and took the field in person; and the result was the acquisition of Pomerania as far as the river Peene, with Stettin, and the islands at the mouth of the Oder, on payment of 2,000,000 thalers (about $1,400,000). The following characteristic speech was addressed by the king to his privy council when about to take the field for this war: "As I am a man, and may therefore die of a shot, I command you to take good care of Fritz [the crown prince Frederic, then 3 years old]; and I give all of you, my wife to begin with, my curse, if you do not bury me at Potsdam in the church vault there, without feasting and without ceremony." The wife of this amiable husband, Sophia Dorothea of Hanover, bore 10 children; among whom the eldest son (afterward Frederic the Great) and a daughter, Wilhelmina, incurred the ferocious hatred of the father. The king strove hard to cut off the young prince from the succession, and endeavored to force him to renounce it. The youth consented on condition of his father declaring that he was not his father. The old king, whose conjugal sentiment was severely shocked at this unanswerable retort, was silenced by it, and died at length in his son's arms. His son wrote of him: "He had an industrious spirit in a robust body, with perhaps more capacity for minute details than any man that ever lived; and if he occupied himself with little things, it was that great results might be the consequence." His character was singularly full of contradictions. He was at once just and cruel; parsimonious and liberal; a careful and a brutal father; a defender of Lutheranism, yet punishing metaphysicians with exile. He left to his son $6,090,000 surplus money, and 72,000 soldiers.

FREDERIC II., 3d king of Prussia, known as Frederic the Great, born in Berlin, Jan. 24, 1712, died at the chateau of Sans Souci, Aug. 17, 1786. He was the eldest son of King Frederic William and the princess Sophia Dorothea, daughter of George I. of England. From childhood up to the age of 20 he was subjected to a cruel paternal tyranny. His father's savage nature vented itself upon the son, apparently an especial object of aversion. The prince, educated chiefly by French refugees, conceived a strong passion for French literature. He knew nothing of any other foreign language. Latin his father positively forbade. Frederic, devoted to poetry, but ignorant of Dante or Shakespeare, Virgil or Homer, surrendered himself to Voltaire and the *Henriade*. "My royal titles," he wrote to his idol, "shall run thus: 'By the grace of God, king of Prussia, elector of Brandenburg, possessor of Voltaire,' &c." Within a week he wrote to Al-

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garotti that he knew Voltaire was a scoundrel, but that he could make use of him. *Je veux savoir son Français; que m'importe sa morale?* Frederic was endowed by nature with a vigorous and acute understanding, with firmness of temper, and indomitable will. After narrowly escaping death from his father's hand, he determined to seek safety in England with his uncle George II. He was overtaken, brought a prisoner to Custrin, was made to witness the execution of a young officer who had been privy to his flight, was himself condemned as a deserter, and was only saved by the interposition of the emperor of Austria, the kings of Sweden and Poland, and the states of Holland. His father caused him to be informed that if he would renounce the throne he should be allowed to study, travel, or do whatever he pleased. "I accept," said Frederic, "if my father will declare that I am not his son." Released after a long imprisonment, he was appointed a councillor of war, and charged with duties which virtually banished him from court. In 1733 his father required him to marry Elizabeth Christina, daughter of the duke of Brunswick-Bevern, and in 1734 permitted him to take up his residence at the castle of Rheinsberg. Here he could pursue his favorite amusements unmolested. A few French and German savants, poets, and artists were his guests, and with these he could practise his flute without fear of its being broken over his shoulders; he dined with no fear of plates hurled at his head; he could write verses without being kicked and dragged by the hair; in short, he was released from intercourse with his father. Here he wrote many of his works, including the "Anti-Macchiavelli" (the Hague, 1740). Meantime the heart of the old king grew softer; a reconciliation followed; and the father, pressing his son to his heart, sobbed forth with almost his latest breath: "My God, my God, I die content, since I have such a noble son and successor." On the death of Frederic William in 1740, Frederic became king at the early age of 28. His character had been wholly misconceived by his subjects and by the world. One class thought him a mere sensualist, a rhapsodical voluptuary; others looked forward to a reign of moderation, peace, and universal benevolence. Both of these classes of judges, with "Anti-Macchiavelli" before them, and a knowledge of the epicurean abode at Rheinsberg, might find ground for their predictions; and both were equally confounded at the almost instantaneous transformation effected by the crown. A military despot, listening to no council, confiding in no friend, bent upon the single purpose of enlarging his monarchy, he regarded himself as an instrument appointed to elevate Prussia, and embody in the parvenu title of Prussian king that substantial possession of royal power which could only come from enlarged dominion. The pragmatic sanction of Charles VI., guaranteed solemnly by Europe, and by no member of the family of nations more solemnly than by Prussia, had, it was supposed, secured the peaceful inheritance of the Austrian dominions to the young Maria Theresa as archduchess of Austria and queen of Hungary and Bohemia. Frederic, immediately on her father's death, sent her an offer of pecuniary aid and his vote for her husband Francis as emperor of Germany, on condition of the cession of the duchies of Glogau and Sagan, to which, as well as the greater part of Silesia, the house of Hohenzollern laid claim. This being rejected, on Dec. 13 he entered Lower Silesia at the head of his army, routed the handful of Austrians who were quartered on the frontier, and overran the province. In 6 weeks he returned to Berlin in triumph. It was the dead of winter, and the queen, almost incredulous of what had happened, was honored with proposals of peace and alliance. Frederic officially pretended to justify himself, but privately acknowledged that "ambition, interest, the desire to make people talk about me, carried the day; and I decided to make war." He had inherited from his father a splendid army of 70,000 men, at that period the finest troops in the world. There was in the treasury a surplus of $6,000,000. He felt that a bold stroke might be made, and that by means of a strong military organization he could obtain for his two and a half million subjects a foremost place among the great nations around him. Hastening in the spring (1741) to rejoin his troops, he fought his first battle at Mollwitz. His army was victorious, but their leader had fled. He had beheld real war for the first time, and so completely lost self-command as to put spurs to his horse and gallop many miles from the field. His personal courage, which this event seemed for the moment to call into question, had been previously well established, when, a volunteer under Prince Eugene against the French, he sacrificed the pleasures of Rheinsberg for a few weeks; but he saw during that campaign nothing of the fury and carnage of war. The battle, fought April 10, 1741, decided the fate of Silesia. It was, however, the signal for a general war in Europe, known as that of the Austrian succession. Bavaria, with France, now took up arms. A French, Saxon, and Bavarian army invaded Bohemia, while Frederic marched into Moravia. The fortunes of the youthful queen grew darker still, when England, her last ally, determined to be a neutral spectator of the conflict. Frederic gained a second victory at Chotusitz (Czaslau), May 17, 1742, and at once effaced by personal prowess the blot upon his victory at Mollwitz. Accepting English mediation, Maria Theresa made peace with Prussia by a treaty concluded at Breslau, June 11, and ceded Silesia and the county of Glatz. Frederic withdrew from Moravia, while the Austrians everywhere triumphed against France and Bavaria. England meanwhile declared for Austria, and British troops fought at Dettingen. Frederic grew anxious in the midst of ceaseless Austrian victories, and in Aug. 1744, marched into Bohemia at the head of 100,000 men, and took Prague.

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He felt that he had no right to expect forbearance after his own perfidious conquest of Silesia; and accordingly, with no more notice than at first, he threatened Vienna. He confesses, however, that this campaign was filled with blunders; that no general ever committed graver faults; and it appears that during this year he first learned to be a general. He retreated rapidly, but only to retrieve the past. Next year, at Hohenfriedberg, he defeated a joint army of Austrians and Saxons, June 4, 1745, in a manner which placed him at the head of contemporary commanders. This victory was followed by those of Sorr (Sept. 30) and Kesseldorf (Dec. 15), and the fall of Dresden; and having no longer reason to fear that Maria Theresa could avenge herself, he deserted his French ally, and made peace with England and Austria by the treaty of Dresden (Dec. 22), by which he acknowledged Francis as emperor, and was confirmed in the possession of Silesia. Frederic by this time had doubled the number of his subjects, and had succeeded so well in humbling Austria and her allies, that he appeared to hold in his hand the balance of power in Germany. His people now enjoyed 11 years of peace, during which he devoted himself to the organization of his states and his army, the advancement of the arts, agriculture, manufactures, commerce, and education, the amelioration of the laws, and the increase of the public revenues. He also resumed his literary occupations, and wrote his "Memoirs of the House of Brandenburg" (2 vols., Berlin, 1751), his poem of the "Art of War," and many other productions in prose and verse. This was a period, nevertheless, of constant anxiety and insecurity; and learning, in 1756, that a new coalition was forming against him, Frederic at once prepared for the encounter. Although at the moment in alliance with France and Sweden, he resolved to rely as far as possible upon himself alone. Wholly distrusting the French ministry, he turned suddenly to England. His offer was readily accepted. Prussia threw off France; and England, Austria. The two rejected parties forthwith allied themselves, and the whole face of affairs was changed. Sweden, the tool of France, followed the French leading; and Frederic, with scarcely 5,000,000 subjects, including the conquered Silesians, found himself alone on the continent against 100,000,000. It was resolved to crush him; but those who made this resolution knew little of the prodigies of which this man was capable. He had foreseen their designs, detected all their secret intrigues, and resolved to strike the first blow. Accordingly, in June, 1756, with 70,000 men, he entered Saxony, and commenced the famous 7 years' war. His army had grown to 160,000 men. His enemies could bring 600,000 troops into the field, and there was not a politician in Europe who did not look upon his destruction as certain. He himself scarcely doubted it. He knew, however, that he had some advantages. He had an overflowing treasury at home, and plenty of money from England, and he hoped that genius, judgment, and resolution, with ordinary good fortune, might at least sustain him until his enemies should quarrel among themselves. At Dresden he seized some state papers which exposed the designs of the coalition. They were published, and the world saw that this time he had right on his side. Saxony was reduced, and became in effect for the time a part of his dominions. He levied troops and supplies; and thus, within a few weeks, one of the confederates was made to turn his weapons against the others. The next campaign opened with the great battle of Prague, May 5, 1757. Frederic was victorious, but lost 12,000 men. A second battle was fought and lost at Collin, June 18. Frederic abandoned Bohemia. French troops invaded Prussia, and his army lost confidence. French, Swedes, and Russians were marching upon Berlin; and Frederic, mourning the death of his mother, whom he tenderly loved, provided himself with poison, and, resolving never to be taken alive, meditated suicide. He marched from Bohemia against the French. With half their numbers he defeated them at Rossbach, and took 7,000 prisoners (Nov. 5). On Dec. 5, at Leuthen, with 30,000 men, he attacked 80,000 Austrians (according to Kohlrausch), killed or captured 21,000 of their number, and took 130 guns, 50 standards, and 4,000 wagons. Early in 1758 he was again ready for action, and with 37,000 troops fought almost hand to hand with 60,000 Russians at Zorndorf. It was the fiercest and bloodiest battle of the war. Frederic ordered that no quarter should be given, so enraged was he with the devastations committed by the invaders; and 19,000 Russians and 11,000 Prussians lay upon the field, dead or wounded, at the close of this fearful day. The Russian survivors abandoned Prussia immediately, and Frederic marched into Saxony. He had beaten French, Austrian, and Russian armies in turn, each with more than double his force; but close upon these triumphs followed a chain of disasters which would have overthrown any other commander. At dead of night he was surprised and terribly defeated at Hochkirchen, but rallying in an incredibly short time he rescued Dresden from an overwhelming army of Austrians, and went into winter quarters at Breslau. The 4th year opened with the Austrians overrunning Saxony, Russians victorious upon the Oder, Frederic utterly routed at Kunersdorf, and Berlin saved only by the king's miraculous energy. The 5th year saw the capital in the hands of the enemy, while Frederic won great battles at Liegnitz and Torgau. The 6th year was also unfavorable, but he still fought on. The circle seemed to be closing around him, and he grew savage with despair. England deserted him, but Russia withdrew from the coalition. Frederic broke into Silesia and defeated the Austrians at Buckersdorf. The armies of France were meanwhile withdrawn, France declaring future neutrality; and Prussians and Austrians stood alone against each other. The

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empress now gave way, and in Feb. 1763, peace was signed at Hubertsburg, leaving Frederic in possession of Silesia, the sole object, short of saving Prussia itself, for which he had fought. After an absence of 8 years he reëntered Berlin in triumph. The city had been more than once plundered; the population had suffered frightfully. He found the number of his subjects diminished by $\frac{1}{16}$; a sixth of the male able-bodied adults had died upon the field of battle. Cossacks and Croats had slaughtered young and old, women and children. Fields were unsown; villages and hamlets were deserts. But, say historians, Frederic did not owe a dollar. His first object was the thorough restoration and reorganization of the army. During every moment of the 24 remaining years of Frederic's life, he was armed at all points. His energies, meanwhile, were employed with equal devotion in the restoration of his country. The corn which had been provided for the next campaign was bestowed forthwith upon the destitute. In Silesia taxes were remitted for 6 months; in Pomerania and New Brandenburg for 2 years. Immense sums of money were expended in agricultural and industrial improvements; in all, during the remainder of his reign, 24,000,000 thalers. To meet these and other similar ends, the most rigid economy was practised. The royal household was so frugal that the king saved annually from the sum appropriated to his court nearly 1,000,000 thalers. His envoys in England and France each had salaries less than $5,000 a year. The king himself had but one fine dress during the remainder of his life. Shabby old garments and snuffy yellow waistcoats were his daily wear; and when it was found at his death that he did not possess a single decent shirt, he was buried in one belonging to his *valet de chambre*. In one fancy alone was he ever enticed from an excess of economy; this was his love of building. He was himself the great exemplar of industry. Twenty hours in the 24 he spent in some active bodily or mental employment. He rose at 4, and retired at midnight. Dinner was the scene of intellectual activity, a school of wit and discussion. Religious persecution was unknown in his dominions; perfect order reigned throughout; property was secure; speech and the press were free. Lampoons and libels on himself he wholly disregarded. "My people and I," he said, "understand each other. They are to say what they like, and I am to do what I like." Cheap and speedy justice was administered. In commercial policy and international law he was in advance of his time. Devoted as he was to letters, he never allowed the passion for literature to divert him from duty. He had no knowledge of the force of the German language, and spoke of it with contempt. Yet he never wrote French correctly. Respectable as he was as a historian, and voluminous as a versifier, he never learned to spell the language which he idolized. It has been said of him that in action he was a German prince, and in speculation a French philosopher. In the year 1772 was contemplated the dismemberment of Poland. It originated between Frederic and Catharine of Russia; for it is certain that a most unwilling consent was wrung from Maria Theresa. Frederic took possession of his share in Sept. 1772, and issued in justification of himself a manifesto so vain, that it has been called an insult added to the injury. No other warlike event occurred, except the threatening of another war with Austria on the subject of the Bavarian succession. The emperor Joseph II. laid claim to it, and entered Bavaria with an army in 1778. Frederic interposed as protector of the rightful heir, the duke of Deux Ponts. Some skirmishes ensued, when Maria Theresa prevailed upon her son to forego his claims. Peace was accordingly signed, May 13, 1779. Later important public acts of his life were the establishment, in 1785, of the so called confederation of princes (*Fürstenbund*); and a treaty with the United States of America, embodying the most elevated principles of international rights. Without much community of political sentiment, he was friendly to the American patriots, and gave evidence of his dislike of British policy in employing Hessian troops across the Atlantic, by levying the same toll per head upon the recruits which passed through his dominions as was charged upon "bought and sold cattle." Washington commanded his admiration, and Mount Vernon received among its treasures a Prussian sword of honor, forwarded from Potsdam with the words: "From the oldest general in the world to the greatest." Frederic died after a severe attack of dropsy, at the age of 74; he left no children by his wife, with whom he never cohabited, and was therefore succeeded by a nephew, Frederic William II., to whom he left a treasury containing a surplus of 72,000,000 thalers, an army of 220,000 men, a territory increased by 29,000 sq. m., and a people industrious, intelligent, and happy. On his accession he had 2,240,000 subjects; at his death the number exceeded 6,000,000. His works were published by order of the king of Prussia, under the auspices of the royal academy of sciences (30 vols., Berlin, 1846–'57). Extensive works on Frederic have been written by Kolb and Preuss. Of Carlyle's "History of Frederic," to be completed in 4 vols., 2 vols. have been published (Aug. 1859). *Friedrich der Grosse und Katharina II.*, by Kurd von Schlözer of St. Petersburg, appeared in Berlin in 1859.

FREDERIC WILLIAM II., king of Prussia, born Sept. 25, 1743, died Nov. 19, 1797. He was the grandson of Frederic William I., nephew of Frederic the Great, and son of the prince Augustus William, who, having incurred the resentment of his brother the king by an unsuccessful retreat after the disastrous battle of Collin (1757), shortly after died. Frederic William, having become heir presumptive to his uncle, received from him but rare marks of cordiality or affection, was rather austerely educated, and often exposed to all the dangers of the war during the last period of the 7 years'

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struggle. He enjoyed little freedom in the second and peaceful half of Frederic's reign, was obliged to repudiate his first wife, Elizabeth of Brunswick, because of ill conduct, and lived in a circle of his own, in which some visionaries of the then powerfully organized sect of illuminati were particularly conspicuous, who maintained their influence over him even after his accession to the throne. This took place on Aug. 17, 1786. Freed from his long continued restraint, the new king gave himself up without moderation to his voluptuous inclinations. Mistresses and favorites reigned in the court and squandered the treasures of the state. The favor of the people he sought to gain by ostentatious mildness; even the discipline of the army, so renowned under Frederic, was relaxed. The first important act of his policy abroad, which was but slightly influenced by the energetic minister Herzberg, was to reinstate in power his brother-in-law the stadtholder of the Netherlands, who had been deposed by the anti-Orange party. A Prussian army under the duke of Brunswick entered Holland, occupied Amsterdam, and restored the ancient order of things, which was confirmed by a treaty concluded in 1788, at the Hague, by Prussia, England, and Holland. Alarmed by the alliance of the emperor Joseph II. with Catharine II. of Russia, and by the successes of the Russians in the war against Turkey, he concluded a treaty with the latter power guaranteeing all its possessions. An army was assembled in Silesia, near the Bohemian frontier. Before the outbreak of the war, however, Frederic William wavered, and finally restored his good understanding with Austria by the treaty of Reichenbach (1790), concluded with the successor of Joseph, Leopold II., who soon also made peace with the Porte. Russia, however, was allowed to continue her operations undisturbed, and the encouraging promises made to the Belgian patriots were soon forgotten. Herzberg resigned. The interview at Pilnitz with the emperor (1791) prepared the first coalition against the French revolution. The hostile operations began in the spring of 1792. The duke of Brunswick entered France in June; the king and the crown prince, the son of his second wife, Louisa of Hesse-Darmstadt, joined him soon after. Want of harmony and repeated blunders on the part of the allies, revolutionary fanaticism and the skill of the commanders on the side of the French, soon turned the scale in favor of the latter, compelling Frederic William to keep the defensive, and finally to conclude the treaty of Basel (1795) with the republic, in which he ceded his territories beyond the Rhine, contracting for future indemnities and a kind of protectorate over northern Germany. His participation in the affairs of Poland, fickle and treacherous as his policy was, was productive of more advantageous results. Having encouraged the so-called Long Polish diet in its efforts to regenerate the state and to make it independent of Russia, by a treaty in which he guaranteed its integrity (1790), he afterward, when engaged in the war with France, found it more convenient and more profitable to share the prey with Russia and Austria. He marched his army into Poland, and actively promoted the second and third dismemberment of the unhappy republic (1793–'95). His share was large, extending to the Niemen, and including the capital, Warsaw. These wars and the extravagance of the court exhausted the finances of Prussia. Intolerant edicts and severe restrictions of the press contributed to make his reign unpopular. It must, however, be acknowledged that it was not without merit in developing the resources of the state and the welfare of the people by useful internal improvements. The juridical organization of Prussia was also greatly promoted under Frederic William.

FREDERIC WILLIAM III., son and successor of the preceding, born Aug. 3, 1770, died June 7, 1840. Educated with care by his virtuous mother, Louisa of Hesse-Darmstadt, he had ample opportunity of comparing, at the courts of Frederic the Great and of his father, the opposite influence of royal virtues and vices upon the affairs of his state; and he early contracted the love of order, discipline, economy, and labor, which in after time contributed no little to the prosperity of his people. He accompanied his father to the conference of Pilnitz, and to the army of the first coalition against France, and in 1793 married the beautiful and accomplished princess Louisa of Mecklenburg-Strelitz, after his accession to the throne (1797) the most popular queen of Prussia. The great task of the new reign was to purge the court and the administration of the creatures and abuses of the preceding. This was done with energy. The unpopular edicts restricting the press and the freedom of religious instruction were abrogated, and economy and order restored in the administration. In his foreign policy the young king maintained the neutrality imposed by the treaty of Basel, the temporary stipulations of which were made definite by the treaty of Luneville (1801). For its cessions on the left bank of the Rhine, Prussia soon after received ample compensations in small territories deprived of their independence as members of the empire by decree of the Germanic diet. Satisfied with his acquisitions and political influence in the north of Germany, Frederic William refused to join the third coalition against France which was formed by England, Russia, and Austria. But when the French armies had infringed the neutrality of the Prussian territories, Frederic William secretly allied himself with Alexander of Russia, during a sudden visit of the latter at Berlin. Hesitation, however, spoiled the effect of this alliance, and the battle of Austerlitz was followed by a new treaty with Napoleon (Dec. 1805). Ceding Anspach, Cleves, and Neufchâtel, it received Hanover from the conqueror. The consequence of this exchange was what Napoleon wanted, a declaration of war by England against Prussia. The latter was also embroiled with Sweden. Having made peace

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with these enemies, Frederic William made peremptory demands on Napoleon in behalf of the neutrality of his state and its allies in northern Germany. Napoleon answered with prompt hostilities, and the battles of Jena and Auerstädt were both fought on Oct. 14, 1806. The powerful Prussian army was broken, Berlin was occupied by the enemy, and the fortresses surrendered at the first summons. The aid of Alexander was of little avail. After a winter campaign in Prussian Poland and the indecisive battles of Pultusk (Dec. 26) and Eylau (Feb. 8, 1807), Napoleon conquered peace by the battle of Friedland, won on the anniversary of Marengo (June 14). The treaty of Tilsit (July) sacrificed one half of Prussia, parts of which were transformed into the duchy of Warsaw, and others attached to the kingdom of Westphalia. The other half remained for years in the hands of the conqueror, and was treated as a subdued province. The king, who paid a visit with the queen to Alexander, could not return to his capital before 1809. This gloomy period, however, became one of the most successful in the history of the state by a series of salutary and energetic reforms, undertaken and executed particularly under the celebrated ministers Stein and Hardenberg. Serfdom was abolished, the towns obtained some independence in the management of their own affairs through city representatives, the royal domains were sold, convents and ecclesiastical foundations converted into state property, public instruction was organized, and the new university of Berlin founded. The new system of military organization of Prussia had also its origin in that period. In 1810 the king lost his wife, the faithful companion of his misfortunes. In 1812 he was compelled to aid Napoleon with an army against Russia. Forming the left of the great French army of invasion, it was saved on the retreat by a special arrangement between its commander, York, and Diebitsch. York was officially blamed, but soon received a due acknowledgment of his patriotic act. Having transferred his residence to Breslau (Jan. 1813), Frederic William now issued his famous proclamation, which was answered by a general rising of the nation against France. The capital of Prussia alone is said to have contributed a force of 10,000 men. Fortunately, prudent measures had been adopted in secret to prepare for the struggle. The youth, meeting privately, had been drilled in the use of arms in small detachments. Thus the power of the people answered to their will. The militia having been summoned, war against France was declared on March 17. The situation had its dangers. The French still held the fortresses of Prussia and Poland; their army in the dominions of the king still amounted to 60,000. But the hour of success had passed for Napoleon. The continual desertion of his allies served to strengthen the phalanx of the coalition after every defeat of his armies. His enormous new levies were not sufficient to cover the extraordinary losses, and to face so many enemies. The Prussians fought bravely in various engagements in 1813 and 1814 (see BLÜCHER), and the king often gave proofs of personal activity and courage. He entered Paris with his allies, accompanied Alexander on his visit to England, made, in Aug. 1814, a triumphal entry into his capital, and repaired to the congress of Vienna. The stipulations of this congress conferred on Prussia greater power than it possessed before the wars, enlarging it particularly with parts of Saxony, one of the last allies of Napoleon. The sudden return of the captive of Elba called the Prussian army again to arms, and Blücher, after his previous defeat, appeared at Waterloo in time to finish the great struggle. The last 25 years of the reign of Frederic William form a period of undisturbed peace and prosperity for Prussia. Closely allied with the czar Alexander, and afterward with Nicholas, the king pursued a policy of strict conservatism. Much was done for internal improvements, little for political reform. Revolutionary agitations, wherever they manifested themselves, were suppressed with severity. Science, however, was patronized, and the king could boast of the friendship of the Humboldts. The last years of his reign were agitated by a strife with the Roman Catholic clergy. The eldest of his 4 sons succeeded him as Frederic William IV. One of his daughters was married to the emperor Nicholas. In 1824 he had formed a morganatic marriage with the countess Augusta of Harrach, whom he made duchess of Liegnitz.

FREDERIC WILLIAM IV., son and successor of the preceding, born Oct. 15, 1795. He received a careful scientific education, though his boyhood was passed in the most disastrous period of Prussian history, and his youth in that of the great struggle against Napoleon. Ancillon, Delbrück, Scharnhorst, Knesebeck, Savigny, Ritter, and Rauch were among his teachers in philosophy, belles-lettres, military science, political economy, and art. He was often present on the scene of action during the last campaign against Napoleon, became familiarly acquainted with many distinguished men of his age, of whom Humboldt remained attached to him through life, and developed his taste for the fine arts while residing in Paris after its occupation by the allies, and on a journey to Italy in 1828. Admitted to the councils of his father, he evinced a marked independence of opinion with much administrative ability. As military governor of Pomerania, his affability gained him general popularity. Great expectations had been formed of his future career when he succeeded to the throne (June 7, 1840). His first solemn declaration at Königsberg, a limited political amnesty, the reinstating of Arndt, the old liberal poet, the reappointment to office of the popular lieutenant-general Von Boyen, the conciliatory termination of a difficulty between the state and the Roman Catholic clergy, were hailed with applause; but the appointment of statesmen like Hassenpflug and Eich-

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horn, the patronage bestowed on the nobility, as well as on the representatives of the historico-romantic and pietistic schools, the dismissal of Bruno Bauer from his professorship, the suspension of Braun, the expulsion from the kingdom of Prussian and non-Prussian democrats, among others of Herwegh, Itzstein, and Hecker, the severe application of literary censorship, and the cordial relations of the court with the czar Nicholas, the brother-in-law of the king, soon destroyed the hopes of the liberal part of the nation. An attempt on the life of the king by the dismissed burgomaster Tschech in 1844 was punished with death. The development given to the representation by provincial estates, which had been introduced under the preceding reign, by the convocation of their standing committees in 1842, and by the convocation of the united provincial estates of the kingdom in Feb. 1847, was made less significant by the distinct declaration of the king that the representatives, far from becoming legislators, would be allowed only to give advice to the unlimited sovereign, and that he would never consent to bind his inherited authority by a written compact. Periodical meetings of the united assembly were asked for in vain. The government, though granting general toleration, declared against the separation of the church from the state, and the emancipation of the Jews, and avowedly sought to rule the kingdom in conformity with the views of the school generally known as pietists. Much more was done for the material interests of the state through internal improvements, commercial union with foreign states, and the commercial union with the north of Germany (*Zollverein*), which also extended the political influence of Prussia. The Polish conspiracy of 1846, which threatened the eastern possessions of the king, was detected in time in the duchy of Posen; the outbreak in the same province was easily suppressed; the insurgents of Cracow, who laid down their arms on Prussian territory, were treated with rigor. The people were already politically agitated by the lively discussions of the diet (from April 11 to June 22, 1847), and of its standing committees, assembled Jan. 18, 1848, and also by the trial of the insurrectionists of Posen, and of Mieroslawski, the destined leader of the Polish movement, as well as by the victory of the liberals in Switzerland over the *Sonderbund*, the constitutional movements in Italy, and the revolution in Sicily, when the news of the French revolution of Feb. 24 involved the whole of Germany in a flame. The popular movement was victorious all over the south-west and south of the confederation, before Frederic William was forced to yield to its irresistible current. Even after the fall of Metternich in Vienna (March 13), he was determined to maintain his royal authority, and to grant liberties only as free gifts. Threatening popular gatherings in Berlin were dispersed by his faithful soldiery before he proclaimed the freedom of the press and the promise of a change in the form of government. These concessions were received with enthusiasm, but the people still demanded the removal of the hated troops from the capital, and for this purpose a deputation of citizens repaired to the palace (March 18), while a crowd of people assembled before it. The deputation was refused admittance, and soldiers advanced from the court of the palace to clear the place. Some shots were fired. Immediately the people dispersed in every direction with cries of "Treason! they are murdering us! revenge!" Hundreds of barricades were erected in a few hours, the arsenal was stormed, and a furious fight ensued, which raged till the morning of the next day, when the king commanded the retreat of the troops and their removal from the city. The corpses of the fallen combatants were carried into the courtyard of the palace, and the king was compelled to appear before them with uncovered head; the palace of his then very unpopular brother, the prince of Prussia, was declared national property. The ministry was dismissed, a civic guard organized, and a general amnesty granted. Mieroslawski, who had been sentenced to death, was carried in triumph through the streets of Berlin, and 250 of his associates left the prison with him, and hastened to Posen to commence the restoration of Poland, the new ministry promising its assistance. The king now openly and ostentatiously declared his purpose to take the lead in Germany; the diet was again assembled (April 2), to elaborate a new election law. It was dissolved after the passage of that law on April 5, and a constituent assembly was convened in Berlin (May 22), while the delegates of Prussia also appeared in the national German parliament which in Frankfort-on-the-Main had superseded the diet of the princes (*Bundestag*). Prussian troops were sent to Schleswig-Holstein to assist the German inhabitants in their revolt against the king of Denmark. In Posen, however, where the Poles had risen in a bloody insurrection, the troops restored order after furious contests with the half-unarmed bands under Mieroslawski (April and May). This was the first reactionary victory. Others followed. While the revolution was losing its time in endless speechmaking, framing of constitutions, and scheming on the reorganization of Germany as a united empire, in the assemblies of Frankfort, Berlin, Vienna, and elsewhere; while it was wasting its power in party strifes and useless undertakings, and degenerating through the excesses of the populace, the governments, which had maintained their armies, paved the way for a complete restoration of their power by mutual understanding, skilful counter-revolutionary manœuvres, continually changing ministries, and varying programmes. In Prussia the men who, by their zeal, activity, or popularity, best assisted the government during the dangerous period of the revolution, were the ministers Camphausen, Pfuel, Radowitz, Brandenburg, and Manteuffel, and the generals Willisen and Wrangel. Emboldened by the tried fidelity of

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the army and the growing desire for order among the wealthier classes, by the reaction in France, and the successes of the Austrian government in Prague, Lombardy, and Vienna, Frederic William prorogued the Prussian constituent assembly, transferring it to the town of Brandenburg, closed its sessions by an armed force under Wrangel (November), and finally dissolved it shortly after its reassembling in Brandenburg (Dec. 5), promulgating a liberal constitution of his own (*octroyirte Verfassung*). The last act of the assembly of Berlin, the decree ordering the refusal of taxes (Nov. 15), remained without effect; the new elections took place according to the king's constitution, and the two chambers were convened in Berlin (Feb. 26, 1849), which remained in a state of siege. Of these the lower house was still too revolutionary, and both were dissolved (April 27). In the mean time the king had not only abandoned the cause of Schleswig-Holstein by the armistice of Malmoe, but had also refused to accept the hereditary imperial crown of Germany offered him (March 28) by the Frankfort parliament. The Prussian army now suppressed the revolution in Dresden, after a bloody struggle of 3 days (May), and in the Palatinate and Baden (June), while it was almost a mere spectator in the renewed struggle in Schleswig-Holstein. A confederation of Prussia with Saxony and Hanover (*Dreikönigsbund*, confederation of three kings), and some minor northern states, formed March 26, was hailed by the so called party of Gotha (Gagern, Dahlmann, &c.) as the last anchor of hope for a union of Germany. It ended in failure. Opposed by Austria and its southern allies, it was given up by Saxony, Hanover, and others; its parliament of Erfurt assembled in vain (March 20, 1850). Frederic William, who had in the mean time convoked a new Prussian assembly and confirmed a new constitution with his royal oath (Feb. 6), followed for some time a more popular course in the affairs of Hesse-Cassel (October), but soon yielded to the threats of Austria and her allies (November). Order was restored in Hesse and Schleswig-Holstein, and the ancient Germanic diet was once more established in Frankfort. The revolution was over. A second attempt on the life of the king by Sefeloge (1850) had no connection with it. Only Neufchâtel remained with Switzerland as a conquest of the movement, and was finally, after some threats of war in 1857, ceded to that republic. The policy of the government was peaceful, and Prussia took no part in the war in Turkey, though it participated in the peace of Paris (1856). The constitution was modified and remodified; the revolutionary members of the assembly of 1848, Jacoby and others, were persecuted; the nobility (*die Junker*) and the pietists received new influence; the freedom of the press and of religion was circumscribed. In 1857 the king was seized by a malady connected with temporary insanity, which increasing by degrees, compelled him (Oct 23, 1858) to give up the personal management of affairs, and to repair for the restoration of his health to the Tyrol and subsequently to Italy. His marriage with Elizabeth, princess of Bavaria, being without issue, his brother William, prince of Prussia, born March 22, 1797, became regent. The son of the regent, and heir presumptive to the throne in case of the expected abdication of the king, Prince Frederic William (born Oct. 18, 1831), married Victoria, princess royal of Great Britain (born Nov. 21, 1840), Jan. 25, 1858.

V. SAXONY.

FREDERIC III., surnamed the Wise, elector of Saxony, born in Torgau, Jan. 17, 1463, died May 5, 1525. He succeeded his father Ernest, in 1486, only in a part of his possessions, governing the rest in common with his brother John the Constant, who also became his successor. He was the founder of the university of Wittenberg, and though not an avowed adherent of the reformation, greatly promoted it by his protection. He procured safety for Luther during the diet of Worms, and subsequently sheltered him in the castle of Wartburg. His influence with the emperor Charles V. was due particularly to the circumstance that after the death of Maximilian I. he had refused to accept the crown of Germany, which was conferred, according to his advice, upon that monarch. The peasants' war embittered the last days of his life.

FREDERIC AUGUSTUS I., 1st king of Saxony, eldest son of the elector Frederic Christian, born Dec. 23, 1750, died May 5, 1827. He succeeded his father in Dec. 1763, under the tutelage of Prince Xaver, was declared of age Sept. 15, 1768, and in the following year married Maria Amalia, princess of Deux Ponts. The only fruit of this marriage was a daughter, the princess Augusta. The claims of his mother to the possessions of her deceased brother, the elector Maximilian Joseph of Bavaria, induced him to ally himself with Frederic the Great against Austria in the short war of the Bavarian succession. Subsequently he joined the league of princes (*Fürstenbund*) formed under the protectorate of the Prussian monarch. In 1791 he refused to accept the succession to the throne of Poland, offered him in the name of that country by Prince Adam Casimir Czartoryski. He also rejected the instances of a conference of the emperors Leopold II. and Frederic William II. of Prussia, held at Pilnitz (1791), to join as an independent sovereign the first coalition against the French revolution, though he did not withhold his contingent as a member of the German empire when the war had been declared. In 1796 he took part in the treaty of peace and neutrality concluded with the French republic by the district of Upper Saxony. He maintained his neutrality during the war of 1805, but in the following year joined Prussia in the unhappy contest decided by the battle of Jena. Saxony, which fell into the hands of the French conqueror, was severely punished, and Frederic Augustus was finally

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compelled to throw himself into the arms of Napoleon. Having concluded the treaty of Posen (Dec. 1806), he assumed the title of king, and joined the Rhenish confederation. For the cession of several districts of western Saxony annexed to the new kingdom of Westphalia he was scantily compensated by a part of Lusatia, and after the peace of Tilsit (1807) more liberally by the duchy of Warsaw. He was a faithful vassal of the French emperor during the wars of 1809 against Austria, and 1812 against Russia, and in 1813, when Saxony became the chief scene of the conflict. Having personally joined Napoleon shortly before the battle of Leipsic, he was declared after its bloody issue a prisoner of war by the emperor Alexander, was sent to Berlin, and afterward to the chateau of Friedrichsfeld, but was subseqnently allowed to reside at Presburg during the deliberations of the congress of Vienna. That congress restored to him half of his German possessions, the other half being annexed to Prussia; the duchy of Warsaw was made a dependence of Russia as the kingdom of Poland. Returning to his capital in June, 1815, Frederic Augustus spent the last 12 years of his life in healing the wounds of his diminished country by promoting its agricultural, commercial, and mining interests, by establishing or developing institutions of art and science, and particularly by a strict administration of justice. His grateful subjects bestowed upon him the surname of Just. His brother Anthony succeeded him.

FREDERIC AUGUSTUS II., king of Saxony, born May 18, 1797, died Aug. 9, 1854. He was the eldest son of Maximilian, brother of the kings Frederic Augustus I. and Anthony. Having lost his mother, Carolina Maria Theresa, princess of Parma, at the age of 7, he was educated principally under the care of Forell, a distinguished Swiss, and of Gen. Watzdorf. Though often compelled to leave the capital of his uncle during the later campaigns of Napoleon in Germany, and frequently to change his abode, he eagerly pursued his studies, which included political economy, law, and military science. Botany, however, became his favorite pursuit. When, in Sept. 1830, in consequence of the revolutionary movement in Paris, Dresden became a scene of political commotions, Frederic Augustus was placed by the old king Anthony at the head of the committee for public tranquillity. As the prince was very popular, this measure greatly contributed to quiet the agitation. On June 6, 1836, Frederic Augustus succeeded to the throne. As he was but partially occupied with political affairs, he made botanical tours and journeys to Istria, Dalmatia, and Montenegro (1838), to England and Belgium (1844), to Vienna and Hungary (1845), and to the Tyrol (1846). The movements of 1848, beginning in Saxony, as everywhere else in Germany, with great enthusiasm for liberty and German union, were followed in May, 1849, by a revolutionary outbreak in Dresden. This having been suppressed through the intervention of Prussia, things soon returned to their ancient order, and the reactionary movement continued to the death of the king, which was occasioned by a fall from his carriage on a new tour in the Tyrol. He was twice married, first to Carolina, daughter of the emperor Francis, and, after her death in 1832, to Maria, daughter of Maximilian I. of Bavaria. Both marriages being without issue, he was succeeded by his brother John, the present king.

VI. WÜRTEMBERG.

FREDERIC I. (WILHELM KARL), 1st king of Würtemberg, son of the duke Frederic Eugene, born Nov. 6, 1754, died Oct 30, 1816. He received his first instruction from his accomplished mother, a princess of Brandenburg-Schwedt, and completed his education at Lausanne, after the French fashion of that period, served in the bloodless war of the Bavarian succession, accompanied his brother-in-law, the future Russian emperor Paul, on a journey to Italy in 1782, took service in Russia as governor-general of Russian Finland, and after having left it in 1787, lived for some time in retirement. In 1790 he was a spectator of the sessions of the French national assembly; in 1796 he fought unsuccessfully against the French on the Rhine, and being compelled to leave his country, retired to Anspach, and subsequently to Vienna and London. In the following year he returned to Würtemberg, succeeding his father on the ducal throne. He shared in the war of 1799, received by the treaty of Luneville as a compensation some territories on the left bank of the Rhine, and was allowed to assume the electoral dignity. In 1805 he made an alliance with Napoleon, joined the Rhenish confederation, and received from its protector the title of king. He deserted Napoleon after his disasters. The treaty of Vienna left him in possession of his kingdom. To conciliate his people after 10 years of despotic sway he gave them a charter, which was rejected by the estates. His first wife was a princess of Brunswick Wolfenbüttel, who bore him two sons, William, his successor, and Paul, and a daughter, Catharine, afterward princess of Montfort; his second wife was the princess Charotte Augusta Matilda of England, who died in 1828.

FREDERICSBURG, a city of Spottsylvania co., Va., pleasantly situated in a fertile valley on the right bank of the Rappahannock river, at the head of tide water, 65 m. N. from Richmond, and 110 m. above Chesapeake bay; pop. in 1850, 4,062. It contains a court house and gaol, and in 1850 had 5 churches, 2 seminaries, an orphan asylum, 2 banks, a grist mill, and 2 large tanneries. The Rappahannock, beside supplying it with good water, which is distributed in pipes, is valuable for its motive power, available at the falls just above. A canal extending to a point 40 m. further up the stream affords means of transportation for the products of a rich farming country, and the Richmond, Fredericsburg, and Potomac railroad connects the city with the state and federal capitals. The

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exports, comprising grain, flour, tobacco, &c., are valued at $5,000,000 annually. Marble and freestone abound in the vicinity. Just beyond the limits of the city an unfinished monument, begun in 1833, marks the tomb of the mother of Washington, who died here in 1789.

FREDERICTON, a city and port of entry of New Brunswick, capital of the province and of the county of York, situated on the right bank of the river St. John, 80 m. from the bay of Fundy, and 54 m. N. N. W. from St. John; lat. 45° 55′ N., long. 66° 32′ 30″ W.; pop. in 1852, 4,458. The river is here ¾ of a mile wide, and is naturally navigable to this point by vessels of 120 tons; light steamers can ascend to Grand Falls, 140 m. above Fredericton. The sum of $40,000 was appropriated by the legislature in 1849 for the improvement of the upper course of the river, and the work was commenced during the following year. The city became a port of entry in 1848, and is now the chief entrepot of commerce with the interior and an important station of passenger travel. Merchandise is brought up the river by steamer, except during winter, when transportation is effected by sledges over the ice. Great quantities of timber are collected at Fredericton, and then floated down to St. John, whence they are exported to foreign parts. The lumber business is one of the principal sources of the wealth of the city. Fredericton stands on a low point of land formed by a sharp bend in the river, and is encircled on the land side by a range of hills. It has broad, regular streets, adorned with many fine gardens and shade trees, and with several elegant public buildings. The government house, the residence of the lieutenant-governor, is a stone building at the W. end of the town. The province hall, in which are held the sessions of the legislative bodies; the barracks, capable of accommodating 1,000 infantry and a company of artillery; churches belonging to the Baptists, Episcopalians, Methodists, Presbyterians, and Roman Catholics; and King's college, a freestone structure 170 feet long and 62 feet wide, are the principal other edifices. Fredericton was formerly called St. Ann's, and was made the seat of government by Sir Guy Carleton in 1785. It has suffered at times from terrible conflagrations, one of which in 1825 laid ½ of the town in ashes, while another in Nov. 1850, was still more disastrous.

FREDERIKSBORG, a royal palace built by Christian IV. of Denmark in 1606–'20, near the town of Hillerød, on the island of Seeland, 23 m. N. N. W. from Copenhagen. It is a Gothic castle of red brick, covering 3 small islands in a little lake. The *Riddersal*, or knight's hall, has a ceiling elaborately decorated with carvings, gildings, and paintings, on which 26 artists are said to have worked for 7 years. It has also a collection of portraits, and a richly ornamented chapel, in which all the late kings of Denmark have been crowned. The pulpit and altar in the last are of ebony and silver, exquisitely wrought, and containing upward of 600 pounds of the precious metal.

FREDERIKSHALD, or FREDERIKSHALL, a seaport of Norway, province of Aggerhuus, on the Iddefiord near its junction with the gulf of Swinesund, Skager Rack, 57 m. S. E. from Christiania, near the frontier of Sweden; pop. in 1855, 7,408. The harbor is excellent, and is accessible to the largest class of shipping. The great fire of 1759 nearly destroyed the town, but it has been handsomely rebuilt. It stands around the base of a gigantic rock, on the summit of which, 400 feet perpendicularly over the sea, is the historic fortress of Frederiksteen. The old name of the town was Halden. Charles XII. was killed here, Nov. 30, 1718. Frederiksteen was formerly a fortress of great strength. On 3 sides it is inaccessible. On the only accessible side, close under the outer walls, a rude monument is said to mark the spot of the king's death. The castle was invested in 1814 by the Swedish crown prince, Bernadotte, and its hopeless defence was a prelude to the almost immediate conquest of the kingdom and its union with Sweden, Nov. 4, 1814. About 3 m. E. of the town there is a lake, the *Fem Söe*, the stream from which flows into the fiord near Frederikshald. The waterfalls upon the stream are the most picturesque in S. Norway.

FREDRO, MAKSYMILIAN, a Polish statesman and writer, died in 1676. He spent his life in the service of his country, in the camp as well as in the council, and rose to the dignity of palatine of Podolia. He wrote several works in Polish and Latin, being honored in some with the name of the Polish Tacitus. His principal works are *Monita Politico-Moralia; Fragmenta Scriptorum Togæ et Belli*, "Considerations on Military Service," and "Proverbs and Advice," the latter two in Polish, and all abounding with curious details and keen observations.

FREE CHURCH OF SCOTLAND, an ecclesiastical body originally formed by a separation from the national establishment in the year 1843. No separation so large from any ecclesiastical body had occurred since the St. Bartholomew ejectment of 2,000 ministers from the national establishment of England in 1662. On May 18, 1843, the general assembly of the established church of Scotland met as usual in Edinburgh, the Rev. David Welsh, D.D., being the moderator, and the marquis of Bute being the representative of the queen. After prayer the moderator read a solemn protest on the part of the church of Scotland against the wrongs inflicted on her by the civil power, which protest was signed by 203 members of the assembly. He then laid the protest upon the table, and bowing respectfully to the representative of royalty, left the house, followed immediately by Dr. Thomas Chalmers, Dr. Robert Gordon, Dr. Patrick McFarlane, Dr. John McDonald, Dr. Thomas Brown, and rank after rank of the country ministers. The protesters withdrew to a large hall at Canon mills, preceded and followed by sympathizing crowds, and

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there organized the Free Protesting church of Scotland under the moderatorship of Dr. Thomas Chalmers. It was then found that 475 ministers had separated themselves from the national church. The amount of capital surrendered that day by the protesting brethren, in relinquishing their stipends from the establishment, was stated to be not short of £2,000,000 sterling.—The French revolution had considerably affected the standing both in the church and in society of the evangelical party in the church of Scotland. Their doctrines had hitherto been looked upon as tainted with fanaticism, but the general horror of infidelity awakened by the events in France caused them to be regarded with greater favor, while their impressive preaching, exemplary lives, and solid learning began to give character to the cause with which they were identified; and though as yet a mere handful in the church, they were every day rising in numbers and power. Under the successive leaderships of Erskine, Sir Henry Moncrieff, Andrew Thomson, and Chalmers—men who inherited the principles and many of the varied gifts of Knox, and Melville, and Henderson, the heroes of the first and second reformations, the evangelical party became stronger and stronger until a fair opportunity for testing the power of parties in the church occurred in 1834. In 1706 the treaty of union between England and Scotland was consummated. It contained a special guarantee for the integrity of the church of Scotland as established in 1689 under the reign of William and Mary, free from prelacy, from the royal supremacy in things spiritual, and from the law of patronage. But 4 years after the consummation of the treaty of union (1711) the parliament of Britain violated its pledge, and under the leadership of Bolingbroke lay patronage was reimposed upon the Scottish church. In this act Sir David Dalrymple, one of the Scottish members, sneeringly said that he would be willing to acquiesce, provided that it should be designated by its right name: "An act for the encouragement of immorality and Jacobitism in Scotland." Bishop Burnet, the historian, says of it that it was passed "to spite the Presbyterians, who from the beginning had set it up as a principle that parishes had from warrants in Scripture a right to choose their ministers." Such was the sense of the wrong inflicted by this act, that the Scottish church for a long period annually renewed her protest against it; and during several years after it was passed no patron was found to appropriate the powers which it conferred upon him. Toward the close of the century, however, forced settlements of ministers upon parishes became frequent, and multitudes of the best of Scotland's people were driven forth from her communion. Against such proceedings it was in vain that the evangelical party earnestly and frequently protested; their protests were those of a small minority, whose principles the majority despised and hated. But that minority grew in numbers and in power, especially from the beginning of the present century, and under such leaders as Thomson and Chalmers one abuse after another was rooted out; and at last an act was passed by the general assembly in 1834 designed to be a corrective of the evils of lay patronage—an act which gave to the male heads of families in every parish the right of objecting to any presentee whom the patron might wish inducted into the pastorate over them. This act, commonly called "the veto act," though proposed by one of the senators of the college of justice, the late Lord Moncrieff, and though believed by the church to be entirely within her power as a church established by law to enact, very soon brought her into conflict with the patrons, and through the patrons with the civil courts. On a vacancy occurring in a certain parish the patron presented his *protégé*, who however was vetoed by almost the entire body of inhabitants. The presentee appealed to the civil courts, who at once commanded the presbytery to proceed to his settlement. The presbytery refused; for the law of the church had given the male heads of families, being communicants, a right to object if they could prove sufficient cause to exist. The civil courts of course stood mainly on the interpretation of the law of 1711–'12. The evangelical party, now the majority in the general assembly, believing that law to be both unconstitutional and contrary to the word of God, resolved to stand upon their rights given them by the head of the church in the Holy Scriptures and ratified by the revolution settlement and the treaty of union; and inasmuch as the battle was not theirs only, but that also of the Christian people of Scotland, they resolved to abide by the decision to which they had come in 1834, viz.: that the Christian people had a right by law and by warrant of God's word to be heard in regard to the appointment of a minister over them; and that the acts of ordaining to the ministry and of inducting into a pastoral charge were spiritual acts, in regard to which the church alone had jurisdiction. The supreme civil court of Scotland had interposed its authority against the ordination and induction of a minister. The assembly, when appealed to for advice, by a large majority authorized the presbytery to proceed with the settlement according to the laws of the church. The presbytery were threatened by the civil court with imprisonment and fine should they dare in the exercise of their spiritual functions to set at defiance the interdict of the civil court. Thus a clear and direct collision occurred between the ecclesiastical and civil courts. The ordination and induction of the presentee were consummated, and immediately a complaint was laid against the presbytery before the civil court. They were summoned to appear before the bar of the court, June 14, 1839, which they did. The judges heard their reply, and took a period of 4 days to consider the case, during which it was understood that 5 of the judges voted for a sentence of imprisonment,

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and 6 for the more lenient measure of a rebuke. The rebuke was accordingly pronounced, and the presbytery were dismissed from the bar with the intimation, designed to reach the furthest ear of the church, that a sentence of imprisonment would certainly be pronounced against any presbytery that should afterward be found chargeable with a similar offence. Other cases involving the same principles rapidly arose, and elements of a still more deplorable character were brought into the arena of strife, all of them evincing the purpose of the civil court to reduce the national church to a mere creature of the state. For example, the civil court required a presbytery to take a clergyman on trial, and admit him to the office of the ministry in a particular charge, and to intrude him also on the congregation contrary to the will of the people. The civil court interdicted the establishment of additional ministers to meet the wants of an increasing population. It interdicted the preaching of the gospel and all ministration of ordinances throughout a whole district by any minister of the church under authority of the church courts. It interdicted the execution of the sentence of a church judicatory prohibiting a minister from preaching or administering ordinances within a particular parish, pending the discussion of a cause in the church courts as to the validity of his settlement therein. It interdicted the general assembly and lower judicatories of the church from inflicting church censures—in one case where the minister was accused of theft and pleaded guilty of the charge; in another where a minister was accused and found guilty of fraud and swindling; and in another where a licentiate was accused of drunkenness, obscenity, and profane swearing. It suspended church censures when pronounced by the church courts in the exercise of discipline, and took upon itself to restore the suspended ministers to the power of preaching and the administration of ordinances. It assumed to judge of the right of individuals elected members of the general assembly to sit therein, and interdicted them from taking their seats. By these things the creed of the church as well as her liberties was interfered with, her efforts to promote purity of morals at home and to advance the cause of truth abroad were frustrated, and as a last resource she was compelled to appeal to the parliament of Great Britain. Her "claim of rights," carefully prepared, was presented to the house of commons, March 7, 1843, by the Hon. Fox Maule (now Lord Panmure, and a ruling elder and a member of the general assembly of the Free church); but it was refused by a majority of 211 against 76. It is worthy of notice, however, that of 37 Scottish members present at the division 25 voted for Mr. Maule's motion. The question now was: Will the church retire from her declared principles, or will she, to preserve her liberties, relinquish her connection with the state? The nature of the case admitted of no compromise. If true to herself, the church must resign the position she had occupied since the times of reformation as the national church of Scotland. Without hesitation the decision was made, and 475 ministers gave unto Cæsar the things that were Cæsar's, that they might give unto God the things that are God's. Very few of those who had acted openly with the evangelical party continued in the established church; but while 475 ministers left the establishment, many of the congregations also left it whose ministers remained in; and hence, as well as from the continued accession of numbers in every district of the country, the number of churches now exceeds 800. Retaining all its old and honored standards without the relinquishment of a single principle, the Free church has brought them out into action instinct with new life. The missionaries belonging to the establishment in 1843 to a man threw in their lot with the Free Protesting church; and yet, with churches and parsonages to build for her ministers at home and schools to erect for her children, her college to equip for the training of ministers, and her funds to establish for aged and infirm ministers and ministers' widows and orphans, the number of her missionaries has been largely increased, and there are now over 300 in foreign countries employed directly or indirectly under her jurisdiction and supervision. Her ministers are paid out of a common fund, to which every member of the church is expected to contribute according to his ability, and the dividend accruing from this fund every congregation is at liberty to supplement at its pleasure. To the general statement that since the period of its organization in 1843 down to May 1, 1859, no less a sum than £6,000,000 has passed through the hands of her treasurer to be applied to her various schemes, we add the following abstract, presented to the general assembly in 1859, showing the whole sums raised for the various objects of the Free church of Scotland, for the year from March 31, 1858, to March 31, 1859:

	£	s.	d.
1. Sustentation fund	110,435	7	6
2. Building fund	41,179	2	0½
3. Congregational fund	94,481	19	6
4. Missions and education	55,896	11	0
5. Miscellaneous	41,384	12	10
Total	343,377	12	10½

The material work accomplished by the Free church may be thus summed up: 800 churches erected, a few of them in the cities magnificent structures, along with 600 parsonage houses; 900 school houses; 2 normal schools in the cities of Edinburgh and Glasgow, attended by an average of 1,500 pupils, with a staff of 200 teachers under training; 3 colleges, the principal one in Edinburgh, presided over by the Rev. Dr. William Cunningham, the others in Glasgow and Aberdeen; the assembly hall in Edinburgh, erected during 1858–'9 at a cost of £6,000; and mission premises in the chief cities in the 3 presidencies of India. The average salary of the ministers is £180, with parsonage house and garden, and in some parishes small glebes.

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FREE CONGREGATIONS (Germ. *Freie Gemeinden*), religious bodies formed since 1846 of seceders from the Protestant state churches of Germany. They were preceded by a free association of the liberal or rationalistic party in the church of Prussia, designed to oppose the faith of the symbolical books and vindicate the right of every member of the church to form his own creed from the Bible. The members of this association, which was organized in 1841, called themselves Protestant Friends, while by their opponents they were called Friends of Light. They held several general assemblies at Köthen, the first in the autumn of 1842, the most important in 1845. The leading men in this movement were Uhlich, Dr. Schwarz, and Wislicenus in the Prussian province of Saxony, Rupp at Königsberg, and Archdeacon Fisher at Leipsic. The first formal separation from the state church took place at Königsberg, Jan. 16, 1846, after the dismissal of Rupp from his office by the church government. In the same year another Free congregation was formed at Halle, under Wislicenus, and in 1847 another under Uhlich at Magdeburg. Soon their number rose to more than 100. The first conference assembled at Nordhausen, Sept. 6–8, 1847, at which a strictly congregational form of church government was adopted. No congregation was ever to be bound by the decrees of general conferences, but only to receive from them proposals and advice. The constitution of the individual congregations showed many differences, but was in every case based on thoroughly democratic principles, usually conferring on every member over 20 years old, male or female, the right of voting and of holding office. The apostle's creed was unanimously rejected, and by common consent the words: "I believe in God and his everlasting kingdom, as it has been introduced into the world by Jesus Christ," were adopted instead. Several congregations, as that of Marburg, under the leadership of Prof. Bayrhoffer, also rejected the belief in a personal God apart from the human spirit and the world, but the great majority adhered to that belief. The Prussian edict of toleration of March 30, 1847, secured to them provisional toleration, and permitted public officers to join them, except in the case of school teachers and others whose office presupposed their membership in one of the state churches. The year 1848, and especially the publication of the *Grundrechte* (fundamental laws) of the German people, were very favorable to their cause, with which the democratic party showed a great sympathy. Both suffered from the success of the counter revolution in 1849 and 1850. Since 1850 decrees, more or less restricting the liberty of their worship, have been issued in nearly all the German states. In Bavaria, baptism performed by their clergymen or members was declared invalid. Hesse-Darmstadt silenced their itinerant preachers. Prussia, though the edict of toleration of 1847 was not formally abrogated, closed most of their meetings, alleging as a reason that they were wholly or partly meetings for political purposes. The supreme ecclesiastical council of Prussia excluded them from participation in the sacramental acts of the evangelical church, and prohibited them from acting as sponsors at baptism, and from speaking at funerals in an evangelical cemetery. A conference at Halberstadt, which was held Oct. 3 and 4, 1849, and at which 12 congregations were represented by 9 of their preachers, discussed the propriety of a fusion with the German Catholics, and declared that the most efficient means of the world's redemption and universal happiness was not forms, ordinances, priesthood, and church, but the free spirit, free brotherhood, and free associations. The conference of Leipsic and Köthen, which was commenced in the former place Aug. 22, 1850, and was transferred to Köthen in consequence of difficulties with the police, determined to recommend to the Free congregations and the German Catholic congregations to fuse, which was almost unanimously agreed to by both denominations. In Prussia there were in 1855 about 16,000 souls belonging to the Free or German Catholic congregations, the number of congregations amounting to 50, with 26 preachers. Since Nov. 1858, a steady and considerable increase of members and congregations has taken place, owing to the greater toleration conceded to them by the new Prussian ministry, which abolished the prohibition of their meetings, and exempted their children from compulsory attendance at the religious instructions of the ministers of the evangelical state church. In the province of East Prussia, a provincial congress met, April 25, 1859, at Königsberg, and elected a provincial board of directors. A federal constitution for the united Free and German Catholic congregations of all Germany was adopted at a general council of the dissenters at Gotha, June 16 and 17, 1859.

FREE MASONRY, the system of secrets, ceremonies, and principles peculiar to the order or society of free masons. The origin of free masonry is very obscure. Some writers on the subject, as for instance William Preston, author of a treatise on masonry published in 1792, regard it as coeval with the creation of man. Others, more moderate, find its origin in the religious mysteries of the ancient world, and particularly in a supposed branch of those religious associations formed by the architects of Tyre, who, under the name of the "Dionysiac Fraternity," constituted an association of builders exclusively engaged in the construction of temples and theatres in Asia Minor, and who were distinguished by the use of secret signs and other modes of mutual recognition. The masonic writers place the arrival of the Dionysiacs in Asia Minor at the time of the Ionic migration, when the inhabitants of Attica were compelled to abandon their own country in search of a more fruitful soil and a more extensive territory, and suppose that the Greeks, already advanced beyond their contemporaries

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in a knowledge of the arts and sciences, carried with them into their new territories the mysteries of Athene and Dionysius in all the purity which distinguished these religious associations before they were corrupted by the subsequent licentiousness of the mother country. The date of the Ionic migration is fixed at 1044 B. C., about half a century before the commencement of the building of the temple, thus giving ample time for the establishment of the Dionysiac fraternity in the city of Tyre at the time when Hiram was called upon to assist Solomon in the execution of his design, which he did by sending him a band of Dionysiac workmen, at the head of whom was a widow's son, to whom is attributed the organization of free masonry. The rituals which are used in the lodges of the order are based on the supposition of the truth of this theory. Solomon's temple figures prominently among the symbols of free masonry, and masonic writers abound in allusions to it, one of the latest of their text books calling it "that stupendous edifice which has been and always will remain the admiration of the world." Among many well informed masons, however, no credit is given to these pretensions to so remote an origin, based as they are on exaggerated ideas of the magnitude and importance of Solomon's temple in the architectural history of the world. The celebrity of Solomon's temple and the popular notions of its splendor and vastness may be traced to the period of the middle ages, in which secret associations of practical masons or builders were formed, to which the lodges of the present day probably owe their origin. It was but natural that those who formed the rituals of those imaginative times should resort to the sacred writings and to the most famous structure recorded in them for the mystical and symbolical source of their organization. The great Gothic cathedrals and other buildings of the middle ages, several of which were each many times larger than Solomon's temple, were erected by companies of builders who encamped around them, and who had a peculiar social organization which enabled them to preserve for their own use and benefit many professional secrets, and furnished facilities for mutual defence and assistance of great value in the midst of rude and turbulent communities. Dr. Henry, in his "History of Great Britain," cites the following account of their origin: "The Italians, with some Greek refugees, and with them French, Germans, and Flemings, joined into a fraternity of architects, procuring papal bulls for their encouragement and their particular privileges; they styled themselves free masons, and ranged from one nation to another as they found churches to be built; their government was regular, and where they fixed near the building in hand they made a camp of huts. A surveyor governed in chief; every tenth man was called a warden, and overlooked each nine." In this manner and by these "free masons" were built the magnificent convent of Batalha in Portugal about the beginning of the 15th century, the cathedral of Strasbourg from 1015 to 1439, of Cologne, founded in 1248 and continued for several centuries, beside many famous structures in England and Italy. Rebold, who has written learnedly on this subject, says that the masonic corporations were diffused throughout Europe in the beginning of the 7th century under the same general regulations, but recognized by different names in different countries. Thus in Italy they were known as colleges of architects; in France as free corporations, and sometimes as "pontifical brothers," from the fact that they monopolized the construction of bridges; and in England and Scotland as free masons, a name assumed in consequence of the exclusive privileges which they enjoyed as a corporation of builders. It appears that from an early period many persons who were non-operative masons or architects were admitted into the community, and that men of eminence, and more particularly ecclesiastics, were numbered among its members. These latter, says Mr. Hope, "were especially anxious themselves to direct the improvement and erection of their churches and monasteries, and to manage the expenses of their buildings, and became members of an establishment which had so high and sacred a destination, was so entirely exempt from all local and civil jurisdiction, acknowledged the pope alone as its direct chief, and only worked under his immediate authority, as his own immediate ministers; and thence we read of so many ecclesiastics of the highest rank—abbots, prelates, bishops—conferring additional weight and respectability on the order of free masonry, by becoming its members—themselves giving the designs and superintending the construction of their churches, and employing the manual labor of their own monks in the classification of them." Thus in England in the 10th century the free masons are said to have received the special protection of King Athelstane, who granted them a charter to hold their annual assemblies and to frame the necessary laws for their own government as a corporate body. They met at the city of York in the year 926, and the regulations they there adopted, under the title of the "Gothic Constitutions," after being long lost, were discovered by Mr. Halliwell, the distinguished antiquary, a few years since in the old royal library of the British museum, and published by him in their original form. They penetrated into Scotland about the beginning of the 12th century, and among other edifices, erected the abbey of Kilwinning, which afterward became the cradle of Scotch masonry. In the 13th century we find the same body of architects at work in Germany, and there is a record of a convention held by them in 1275 in the city of Strasbourg, where they were engaged in the construction of its cathedral; at which time, in imitation of their English brethren, they assumed the name of free masons, and took the obligations of fidelity and obedience to the laws and regulations

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of the society. In the course of time the operative character of the association began to become less prominent, and the speculative to assume a preëminence which eventually resulted in a total disseverance of the two. At what precise period we are to date the commencement of this predominance of the speculative over the operative element, it is impossible to say. The change was undoubtedly gradual, and is in all probability to be attributed to the increased number of learned and scientific men who were admitted into the ranks of the fraternity. The "Charter of Cologne," a curious mediæval document purporting to date from the year 1535, speaks of "learned and enlightened men" as constituting a part of the society long before the 16th century, but by many masons the authenticity of this instrument is not admitted. The diary of the celebrated English antiquary, Elias Ashmole, describes his initiation into the order in 1646, when there is no doubt that the operative character was fast giving way to the speculative. Preston tells us that about 30 years before, when the earl of Pembroke assumed the grand mastership of the masons of England, "many eminent, wealthy, and learned men were admitted." In 1663 an assembly of the masons was held in the city of London, and the earl of St. Albans was elected grand master. At that assembly certain regulations were adopted, among which the qualifications prescribed as necessary for candidates to possess clearly point to the speculative character of the institution as the most important consideration. And finally, at the beginning of the 18th century, and during the reign of Queen Anne, who died in 1714, a regulation was adopted, as we are informed by Preston, which provided "that the privileges of masonry should no longer be restricted to operative masons, but extend to men of various professions, provided they were regularly approved and initiated into the order." In 1717 the lodges then in active existence in the city of London united together and formed the grand lodge of England, upon the basis here indicated. This, it must be observed, was not the establishment of a new and hitherto unheard of society, as some of the opponents of the order have maintained, but the reorganization of an old one in a new and more popular form. Long previous to this period the general assemblies of the masons had been annually held in England as in other countries; but Sir Christopher Wren, the grand master in the reign of Queen Anne, having become old and infirm, had neglected the interests of the institution, and the society had fallen into decay, so that in 1715 there were but 4 lodges in active work in the whole south of England, although it is admitted that the masons in the north were in a more prosperous condition. On the death of Sir Christopher Wren no successor was appointed, and the general assemblies were no longer convened. It was during this unpromising condition of affairs that the 4 lodges already mentioned met at the celebrated Apple Tree tavern in Covent Garden, London, and reorganized the grand lodge of England, renewed the annual meetings, and collated and compiled the old rules and regulations which had long been in existence, but for some time past neglected, with the addition of a few new ones now become necessary since the wholly speculative element of the society had so completely taken the place of its former both speculative and operative organization. Free masonry, thus modified in its character, began rapidly to spread throughout the world as a speculative system of symbolism. In 1725 it was introduced in its new form into France, in 1729 into Ireland, in 1731 into Holland, Russia, and Spain, in 1733 into Italy, and in 1736 into Scotland, at which time, Sinclair of Roslin having resigned the hereditary grand mastership of the masons of that kingdom, which had long been vested in his family by royal grant, the grand lodge of Scotland was organized on the same principle that had been adopted 19 years before by the masons of England. An attempt was made in 1730 to introduce the organization into America by the appointment of a provincial grand master of New Jersey, but we have no record of the incumbent having established any lodge under the authority of his deputation. In 1733, however, a lodge was opened at Boston, which was speedily followed by the organization of other lodges in the different colonies. After the assumption of independence by the United States, the lodges of America, all of which derived their warrants of authority originally from the grand lodge of England or that of Scotland, availed themselves of the privileges possessed by such bodies in all independent countries, and organized grand lodges in their respective states. In no country in the world has free masonry flourished with more vigor than in the United States; and notwithstanding a severe but ineffectual opposition to it, which commenced in 1829 by the organization of an anti-masonic party (see ANTI-MASONRY), it has increased in numerical extent with such steady progress that at the present day it numbers, in all parts of the confederation, nearly 5,000 lodges and between 150,000 and 200,000 members. In spite of many attempts to suppress it by both church and state in various countries of Europe, it is firmly planted in every part of that continent, and many lodges beside have been established in Africa and Asia. Its organization in Europe has been frequently used for political purposes, and especially as a cloak to conspiracies against the governments. The employment of it, however, for such objects, is a violation of its constitution, which prohibits political, partisan, or sectarian discussions in the lodges. The most remarkable of these perversions of the institution was in Mexico in 1825, and in the years immediately following. Free masonry had shortly before 1825 been introduced from Scotland, and had been eagerly embraced by a large body of influential politicians who were

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in favor of the independence of the country, but opposed to democracy. They formed a powerful party, which from the Scotch origin of their lodges called themselves the *Escoceses*. An opposition party of democratic principles was formed, with which the American minister, Mr. Poinsett, coöperated, and which called itself the *Yorkinos*, because it constituted a masonic society which had received its charter from the masons of New York through the agency of Mr. Poinsett. The conflict of these parties led for a time to civil war.—The primary organization of the masonic fraternity is into lodges, which must each be composed of at least 7 master masons in good standing. The first and lowest degree of masonry is that of entered apprentice, the second of fellow craft, the third of master mason. The officers of a lodge in the United States are 9 in number: worshipful master, senior warden, junior warden, treasurer, secretary, senior deacon, junior deacon, tiler, and chaplain. There are also two stewards. Of these officers the master, the wardens, and the tiler are essential to any lodge organization. The tiler keeps the door and guards against intrusion. The officers are elected annually by ballot. In each state of the Union there is a grand lodge composed of the representatives of the subordinate lodges, over which it exercises a certain jurisdiction. Its officers are styled grand and deputy grand masters, grand wardens, grand treasurer, grand secretary, grand chaplain, grand deacons, grand marshal, grand pursuivant, grand sword bearer, grand stewards, and grand tiler. There is also a still higher degree of masonry, the members of which are termed royal arch masons, and form royal arch lodges. And beyond this there is still a long series of degrees bearing various titles.—See the "Masonic Text Book," by John Dove (12mo., Richmond, 1854); "A Text Book of Masonic Jurisprudence," by Albert G. Mackey, M.D. (12mo., New York, 1859); the "History of Free Masonry," by J. W. S. Mitchell, M.D. (2d. ed., 2 vols. 8vo., Marietta, Ga., 1859).

FREE THINKERS, a name applied to the opponents of Christianity in England, in the 17th and 18th centuries. Lord Herbert of Cherbury, Hobbes, Toland, Tindal, Woolston, Chubb, and Anthony Collins were among the most noted of their writers. Bolingbroke, Shaftesbury, and David Hume were counted among their ablest representatives. They were never an organized philosophical or religious sect. The French writers who labored for the overthrow of Christianity, partly from the standpoint of deism, partly from that of materialism, and who called themselves *esprits forts*, were in England called free thinkers. Voltaire, D'Alembert, Diderot, and Helvetius are the most celebrated among them. In Germany the rationalists have often been called free thinkers by their opponents.

FREE TOWN, a town of W. Africa, capital of the British colony of Sierra Leone, on the left bank of Sierra Leone river, about 5 m. from the sea; lat. 8° 29′ N., long. 13° 9′ W.; pop. estimated at 16,000. It is situated on an inclined plane, 50 feet above sea level at high-water mark. The streets are wide, well laid out, and ornamented with rows of orange, lime, banana, or cocoanut trees. Several of the houses are commodious and substantial stone buildings. The principal public edifices are St. George's church, the church missionary and Wesleyan missionary institutions, the grammar school, market house, custom house, gaol, and lunatic asylum. The governor's residence, barracks, and government offices are situated on some hills above the town. The navigable entrance of the Sierra Leone river is narrow, there being a large shoal called the Bullom shoal in its centre.

FREEDMEN (*liberti, libertini*), the name of manumitted slaves in Roman antiquity. They were called *liberti* with reference to their masters, and *libertini* with reference to their new rank or condition. According to various circumstances, defined by law, the freedmen became Roman citizens, Junian Latins (from the Junian law which gave them freedom), or *dediticii*. The last were neither free nor slaves. The Junian Latins suffered great disabilities as to property, but could in various ways rise to citizenship. But even the freedmen of the first class were not genuine (*ingenui*) citizens, and remained under certain obligations to their masters. The freedmen wore a cap as a sign of freedom, and took the names of their previous owners. The sons of freedmen became genuine citizens. In later times the number of manumitted slaves increased to an alarming extent, and some of the emperors passed laws restricting manumission. (See SLAVERY.)

FREEHOLD. See ESTATE.

FREEMAN, JAMES, D.D., an American Unitarian minister, born in Charlestown, Mass., April 22, 1759, died in Newton, Mass., Nov. 14, 1835. He belonged to the class which entered the Boston Latin school in 1766, under Master John Lovell. After graduating at Harvard college in 1777, he went to Quebec to visit his father, returned to Boston in 1782, and became reader at the King's chapel in Boston, an Episcopal church. Becoming Unitarian in his views, he induced the society to alter their prayer book in 1785, and in 1787 he was ordained by his own wardens and people by a peculiar service. He continued rector of King's chapel for 55 years, till his death. He was one of the founders of the Massachusetts historical society, was distinguished for his general culture and social virtues, and his published sermons have been regarded as models of English style. They are extensively quoted by Southey in his "Doctor" and his "Commonplace Books." But Dr. Freeman's chief distinction is that he was the first minister in the United States who openly assumed the name of Unitarian, and that through his means the first Episcopal church in New England became the first Unitarian church in America.

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FREEPORT, a township of Cumberland co., Me., on Casco bay, at the mouth of Harrasacket river, 17 m. N. E. from Portland; pop. in 1850, 2,629. It was formerly called Harrasacket settlement, and received its present name on its incorporation in 1789. It contains 4 villages, one of which is called Freeport, 5 churches (1 Baptist, 1 Congregational, 1 Freewill Baptist, 1 Universalist, and 1 Union house), 2 post offices, 34 public schools, 3 saw and shingle mills, and 9 ship yards. In April, 1854, 10 vessels were in course of construction here. Ship-building, navigation, and agriculture are the principal branches of industry. The Kennebec and Portland railroad passes through the town.

FREESTONE, a name often given to the sandstone used for building purposes. (See SANDSTONE.) The name is probably due to its working freely under the tools.

FREEWILL BAPTISTS, or FREE BAPTISTS, a denomination of evangelical Christians in the northern United States and Canada. Its founder was Benjamin Randall (1749–1808), who was one of Whitefield's hearers at Portsmouth, N. H., Sept. 28, 1770; and the impressions made by the sermon, and more especially by the tidings of the preacher's death 2 days later, resulted in his conversion. At first a Congregationalist, he connected himself in 1776 with the Baptist church in South Berwick, Me., and soon after entered the ministry, but was called to account for preaching a doctrine different from that of his brethren. In 1780 he organized in New Durham, N. H., a church holding views similar to his own, which was the nucleus of the new denomination. The distinctive tenets of Randall and his coadjutors were the doctrines of free salvation and open communion, as opposed to those of election and close communion held by the Calvinistic Baptists. They also insisted upon the freedom of the will, as essential to man as a subject of moral government, and therefore as inviolable by the divine sovereignty, and not to be contravened by any explanation of the latter doctrine. Their opponents styled them "General Provisioners," "Freewill Baptists," and "Free Baptists," by the second of which names they have usually been designated, though the last is now preferred in some of their own publications. In government they are Congregationalists. The first church held a conference once a month, which was called a monthly meeting. When other churches were formed in neighboring localities, a general meeting by delegation from the churches was held once in 3 months, which was termed a quarterly meeting. As Randall and his associates travelled and extended the denomination through New Hampshire and the adjacent states, numerous quarterly meetings were organized, and yearly meetings were instituted, consisting of delegates from associated quarterly meetings. At length the organization was completed by the institution in 1827 of the general conference, the most important assembly of the denomination, which is composed of delegates from all the yearly meetings, and convenes once in 3 years. To all these bodies the laity and clergy are alike eligible, and they all combine the services of public worship with the discussion and decision of questions of business and benevolence. In 1827 a correspondence was opened between the Freewill Baptists of New England and a few churches in North Carolina of similar sentiments, the result of which was that the latter in 1828 published their records as the "Minutes of the Freewill Baptist Annual Conference of North Carolina." They soon numbered 45 churches and about 3,000 members, and though never formally united with the denomination in the North, maintained a constant correspondence with it, and subscribed for nearly 500 copies of its organ, the "Morning Star" newspaper. In 1839 Dr. William M. Housley of Kentucky, once a close communion Baptist clergyman, who for doctrinal reasons had taken a letter of dismission and commendation from his former connection, attended the general conference of the Freewill Baptists at Conneaut, Ohio, and there applied for ordination to the ministry. He had already been admitted to the church in that place, and appeared before the conference in order to obtain denominational endorsement as a minister. The prospect was presented of a large accession to the sect from Kentucky, and a council reported that Dr. Housley had approved himself qualified for the sacred office, excepting only that he was a slaveholder. But for this reason alone the council declined to "ordain him as a minister or fellowship him as a Christian," and the general conference after a spirited discussion finally voted without opposition "that the decision of the council is highly satisfactory." The connection of the denomination with slaveholding churches in North and South Carolina was brought before the same conference, and was entirely dissolved. From that time the Freewill Baptists have maintained the position then taken upon the question of slavery. A few unrecognized churches in North Carolina, however, still continue to bear their name. There are several benevolent societies of denominational interest, supported and encouraged by all the churches. The principal of these are the foreign and home mission societies, the education society, and the anti-slavery society, and by all of them an aggregate sum averaging about $10,000 is annually raised. They celebrate anniversary meetings together in the autumn, which are numerously attended from the interest taken in the reports and discussions on prominent reformatory and benevolent movements. The foreign mission society has several stations in Orissa, India. Early noted only for fervent piety, the Freewill Baptists have recently given special attention to the interests of education, and since 1847 have raised nearly $300,000 for educational purposes. They have a flourishing college at Hillsdale, Mich., to which persons of both sexes and all colors are admitted, a theological school at New Hampton, N. H., and 3

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seminaries of high grade and repute at the latter place, at Whitestown, N. Y., and at Lewiston, Me., together with other schools of less note. The Maine state seminary at Lewiston received a liberal endowment from the state on its establishment in 1857. The Freewill Baptist printing establishment is at Dover, N. H., where are published the "Morning Star," which for 33 years has been their weekly organ, the "Myrtle," a Sabbath-school paper, and the "Quarterly," each number of which comprises at least 120 pages. Biographies have been published of Randall, Colby, Marks, Phinney, Martin Cheney, and other clergymen, which throw light upon the history and spirit of the denomination. A general history of the Freewill Baptists is now in preparation under the direction of the general conference. In 1800 the whole number of communicants was less than 3,000. In 1829, when complete returns were for the first time obtained, there were 8 yearly meetings, 22 quarterly meetings, 311 churches, 263 ministers, and 12,860 communicants. There are now (1859) 29 yearly meetings, 132 quarterly meetings, 1,206 churches, 1,133 ministers, and 56,026 communicants, an increase of fourfold within a generation, and of 5,714 communicants within the last year. They are found in all the free states, but are most numerous in New England. There is also in New Brunswick and Nova Scotia a separate and rapidly increasing conference of Free Baptists, of about 4,000 members, not included in the above computation. They have a weekly organ, the "Religious Intelligencer," published at St. John, N. B. The Freewill Baptists correspond by letters and delegations with the General Baptists of England, with whom they agree in doctrine.

FREEZING MIXTURES. From ancient times various methods have been practised of producing low degrees of heat for the preparation in hot weather of grateful cooling mixtures. Some of these, the object of which is more particularly the production of ice, are described in the article upon that subject. Methods of producing intense cold are also noticed in EVAPORATION. Freezing mixtures, properly so called, are solutions of a solid in a fluid, cold being produced by the tendency of the former in passing to the liquid state to render latent a portion of the sensible heat of the mixture. What is called the heat of fluidity is derived chiefly from that which had previously existed within the solid itself in a sensible state. The property of nitre or saltpetre, a common natural production of the East, to render water cold by solution, was known, it is believed, to the ancient Hindoos, though in the "Institutes of Akbar" the discovery is attributed to that prince, who ruled from 1556 to 1605. The directions there given are to throw one part of nitre into a vessel containing 2 parts of water, and then stir in this mixture rapidly for a quarter of an hour a pewter or silver vessel tightly stopped and containing the liquid to be cooled. As early as the year 1556 it was a common practice with wealthy Italian families to cool liquors in a similar manner, and they are supposed to have derived the method from India or Persia. They added gradually 20 to 25 parts of nitre to 100 parts of cold water, and whirled rapidly round in it a globular, long-necked bottle containing the wine or water to be cooled. The salt was afterward recovered by crystallization, and was then ready for the same use again. Boyle, and afterward Fahrenheit, extended this practice to other saline solutions, and Mr. Walker of Oxford and Lowitz of St. Petersburg, in the latter part of the last century and early part of the present, were particularly successful in introducing new salts and developing the principle of their action. The former published essays in the "Philosophical Transactions" in 1795, and again in 1801, with tables of the most important mixtures. Those salts were found to produce the greatest effect which dissolved the most rapidly, and the processes were much more effectual when the materials were previously cooled by immersion in other frigorific mixtures, or when freshly fallen dry snow, or, in lieu of this, finely powdered ice, was added. Mr. Walker thus succeeded in obtaining a degree of cold equal to —100° F. With snow and common salt Fahrenheit reduced the temperature to —32°, and originally proposed this as the method for fixing the zero point of his scale. In this process the salt, by its affinity for water, causes the snow to melt, and the water thus produced dissolves the salt, and both becoming liquid, a large quantity of the sensible heat is rendered latent. The tables of Mr. Walker, still referred to in chemical works, are as follows:

FRIGORIFIC MIXTURES WITH SNOW.

Mixtures.	Parts by weight.	Thermometer sinks	Cold produced.
Sea salt	1	from any temperature to — 5°	..
Snow	2		
Sea salt	2	from any temperature to —12°	..
Snow	5		
Sea salt	10	from any temperature to —18°	..
Chloride of ammonium	5		
Nitrate of potassa	5		
Snow	24		
Sea salt	5	from any temperature to —25°	..
Nitrate of ammonium	5		
Snow	12		
Strong sulphuric acid	1	from +32° to —23°	55°
Water	0.5		
Snow	3		
Concentrated hydrochloric acid	5	from +32° to —27°	59°
Snow	8		
Concentrated nitric acid	4	from +32° to —30°	62°
Snow	7		
Chloride of calcium	5	from +32° to —40°	72°
Snow	4		
Crystallized chloride of calcium	3	from +32° to —50°	82°
Snow	2		
Fused potassa	4	from +32° to —51°	83°
Snow	3		

The effect of the following mixtures is increased by the salts being finely powdered, so that the

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solution may be most rapidly accomplished. The diluted nitrous acid named is composed of fuming nitrous acid 2 parts by weight and 1 of water, the mixture being allowed to cool before using; the diluted sulphuric acid, of equal weights of strong acid and water, and allowed to cool.

Mixtures.	Parts by wt.	Temp. falls from 50° F.	Cold produced.
Chloride of ammonium	5	to +10°	40°
Nitrate of potassa	5		
Water	16		
Chloride of ammonium	5	to + 4°	46°
Nitrate of potassa	5		
Sulphate of soda	8		
Water	16		
Nitrate of ammonia	1	to + 4°	46°
Water	1		
Nitrate of ammonia	1	to — 7°	57°
Carbonate of soda	1		
Water	1		
Sulphate of soda	3	to — 8°	53°
Diluted nitrous acid	2		
Sulphate of soda	6	to —10°	60°
Chloride of ammonium	4		
Nitrate of potassa	2		
Diluted nitrous acid	4		
Sulphate of soda	6	to —14°	64°
Nitrate of ammonia	5		
Diluted nitrous acid	4		
Phosphate of soda	9	to —13°	62°
Diluted nitrous acid	4		
Phosphate of soda	9	to —21°	71°
Nitrate of ammonia	6		
Diluted nitrous acid	4		
Sulphate of soda	8	to 0°	50°
Hydrochloric acid	5		
Sulphate of soda	5	to + 5°	47°
Diluted sulphuric acid	4		

The following is recently recommended as a convenient and efficient preparation: One part by weight of crude powdered sal ammoniac is to be intimately mixed with 2 parts of pulverized saltpetre, and to this mixture, when required for use, is to be added an equal bulk of carbonate of soda.

FREIBERG, or FREYBERG, a walled town of Germany, the mining capital of Saxony, on the Münzbach, 25 m. S. W. of Dresden; pop. about 12,000. It is situated on the N. declivity of the Erzgebirge. The streets are regular, well built, lighted, and paved. There are handsome monuments to Prince Maurice of Saxony, and to Werner, the great mineralogist, and a fine Gothic cathedral, built in the 15th century. The mining academy, founded in 1765, has a museum of model mining machines, and a library of 18,000 volumes. The staple manufactures consist of gold and silver lace, brassware, white lead, gunpowder, shot, iron and copper ware, linens, woollens, ribbons, tape, leather, and beer. Freiberg is an ancient city, and was long the residence of the Saxon princes. Werner, Humboldt, Mohs, and Jameson were students at its academy. The mining district of Freiberg is divided into 5 circles, and contains 150 mines, yielding silver, lead, copper, cobalt, &c. The total mineral product in 1854 amounted to about $800,000, and in 1850 to $1,000,000.

FREIBURG, or FREYBURG, a city of Germany, in the grand duchy of Baden, capital of the circle of the Upper Rhine, on the Dreisam, 83 m. by railroad S. W. of Carlsruhe, and 40 m. N. E. of Basel; pop. about 16,000. It is elevated 940 feet above the level of the sea, and has walls with 3 gates. The streets are in general open and well built, particularly the Kaiserstrasse, which is remarkable for its width and the excellence of its houses. The principal public edifices are the archiepiscopal and ducal palaces; the cathedral, one of the most beautiful and perfect specimens of Gothic architecture in Germany; the old and new universities, the former of which was founded in 1454, has a library of 100,000 volumes, and is famous as a school of Catholic theology; the government offices, courts of justice, town hall, museum, theatre, gymnasium, orphan asylum, hospitals, and seminaries. The manufactures consist of leather, paper, sugar, starch, tobacco, soap, bells, musical instruments, gunpowder, and chemicals. There are also several bleach fields and dye works. The Basel and Mannheim railway passes through Freiburg.

FREIGHT, in law, and in common practice, either the cargo which a ship carries, or the price paid to the charterer of a ship for the carriage of goods. In the earliest case in which the word occurs (Bright *vs.* Cowper, 1 Brownlow and Goldsborough, 21), it is used to mean the cargo carried. But it means in the law, almost exclusively, the money earned by the carriage; and it is principally used in this sense by merchants. (For the law of freight, see SHIPPING.)

FREILIGRATH, FERDINAND, a German poet, born in Detmold, June 17, 1810. Early in life he engaged in mercantile business at Soest in Westphalia, and was afterward a clerk at Amsterdam and Barmen. A volume of poems which he published in 1838 made him one of the favorite poets of Germany. The king of Prussia conferred on him in 1842 an annual pension, which he resigned in Jan. 1844, having adopted democratic opinions. Being persecuted for political reasons, he went in 1845 to Switzerland. In 1846 he went to London, where he was employed until 1848 by the firm of Hnth and co. After the outbreak of the revolution in Feb. 1848, he returned to Germany, and for 3 years took an active part in the efforts of the democratic party. In Aug. 1848, he was arrested on account of his poem *Die Todten an die Lebenden* ("The Dead to the Living"), and tried, but acquitted. In May, 1851, a new writ of arrest was issued against him on account of the second part of his "Political and Social Poems" and his membership in the democratic central committee of Cologne. But he had already left Germany for London, where of late he has managed the London office of the Swiss bank. His *Gedichte* (Stuttgart, 1838; 18th ed., 1857), with which he began his poetical career, is still the most popular of his works. His political poems *Ça ira* (Herisau, 1846), *Die Revolution* (Leipsic, 1848), *Februar-Klänge* (Berlin, 1848), and *Neuere politische und sociale*

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Gedichte (Cologne, 1849; 2d part, Brunswick, 1850), are also valued by those who accord with their principles. Some of these poems, as *Robert Blum*, *Die Revolution*, *Die Todten an die Lebenden*, are classed among the best political poetry of Germany. A tasteful selection of German poetry was published by him in 1854, under the title *Dichtung und Dichter* (Dessau, 1854), and another of English poetry at Stuttgart in 1853, under the title "The Rose, Thistle, and Shamrock." The first complete edition of all his works appeared in New York (*Sämmtliche Werke*, 6 vols., 1858–'9). Some of his poems have been translated into English by Longfellow, of whose "Hiawatha" he in turn published a German version.

FRELINGHUYSEN, Frederic, an American lawyer, born in New Jersey, April 13, 1753, died April 13, 1804. He was graduated at Princeton college in 1770, and in 1775 was sent as a delegate from New Jersey to the continental congress. In 1776 he joined the revolutionary forces, and served with distinction as captain of a volunteer corps of artillery at the battles of Monmouth and Trenton. In the battle of Trenton, it is said, he shot Col. Rall, the commander of the Hessians. He was promoted to be colonel, and served during the remainder of the war. After the peace he filled various state and county offices, and in 1790, when the New Jersey and Pennsylvania troops were called to take part in the expedition against the western Indians, he was appointed major-general by President Washington. In 1793 he was elected a senator of the United States, which post he occupied for 3 years, when, in consequence of domestic bereavement, he resigned, and devoted the remainder of his life to his family and private affairs.—Theodore, an American statesman, son of the preceding, born at Millstone, Somerset co., N. J., March 28, 1787. He was graduated at Princeton college in 1804, studied law with Richard Stockton, and in 1808 was admitted to the bar, where he soon became distinguished as an eloquent advocate. During the war with Great Britain in 1812–'14, he raised and commanded a company of volunteers. In 1817 he was elected attorney-general of New Jersey by a legislature opposed to him in politics, and held the post till 1829, when he was chosen U. S. senator. In the same year the legislature had elected him a judge of the supreme court, which office he declined to accept. In the senate Mr. Frelinghuysen acted with the whig party. He exerted himself in behalf of the Indians; advocated the bill to suppress the carrying of mails on the sabbath; supported Mr. Clay's resolution for a national fast in the season of the cholera; spoke in favor of the extension of the pension system, and acted in unison with Mr. Clay upon the question of the tariff, and the compromise act of 1832. He remained in the senate till 1835, when he was superseded by a democrat. In 1838 he was chosen chancellor of the university of New York, and took up his residence in that city. In May, 1844, the whig national convention at Baltimore nominated him for vice-president and Henry Clay for president. They received 105 electoral votes, while their successful competitors, James K. Polk and George M. Dallas, received 170 votes. In 1850 Mr. Frelinghuysen resigned the chancellorship of the university of New York to become president of Rutgers college, New Brunswick, N. J., and removed to that city, where he now resides.

FREMONT, John Charles, an American explorer, born in Savannah, Ga., Jan. 21, 1813. His father was a Frenchman who had settled in Norfolk, Va., where he supported himself by teaching his native language. His mother, whose maiden name was Anne Beverley Whiting, was the daughter of an opulent and prominent Virginian, connected by marriage with the Washington family. She was left an orphan at an early age, and when 17 years old was persuaded by her relatives to marry Major Pryor, a rich and gouty gentleman 45 years her senior. This union was childless and unhappy, and at the end of 12 years was terminated by a divorce which the friends of both parties combined to procure from the legislature. Major Pryor soon married his housekeeper, and Mrs. Pryor married Mr. Fremont. He died in 1818. The widow with 3 infant children settled in Charleston, S. C. At the age of 15 John Charles entered the junior class of Charleston college. For some time he stood high in college, and made remarkable attainments in mathematics. "But about this time," says Mr. Bigelow, one of his biographers, "he became acquainted with a young West Indian girl, whose raven hair and soft black eyes interfered sadly with his studies." His inattention and frequent absences at length caused his expulsion from the college. After this event he obtained employment as a private teacher of mathematics, and took charge at the same time of an evening school. In 1833 he obtained the position of teacher of mathematics on board of the U. S. sloop of war Natchez, which was then in the port of Charleston, from which she sailed on a cruise to the coast of South America. Fremont was absent in her for more than two years, and on his return to Charleston received from the college which had expelled him the degrees of bachelor and master of arts. Shortly afterward he passed successfully a rigorous examination at Baltimore for the post of professor of mathematics in the navy, and was appointed to the frigate Independence; but he soon resolved to quit the sea, and engaged himself as a surveyor and railroad engineer on a line between Charleston and Augusta, Ga. Subsequently he assisted in the survey of the railroad line from Charleston to Cincinnati, and particularly in the exploration of the mountain passes between South Carolina and Tennessee. He was engaged in this work till the autumn of 1837, when, in consequence of its suspension, he accompanied Capt. Williams of the U. S. army in a military reconnoissance of the mountainous Cherokee country in Georgia, North Carolina,

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and Tennessee. In anticipation of hostilities with the Indians this survey was rapidly made in the depth of winter, and was Fremont's first experience of a campaign amid mountain snows. In 1838–'9 he accompanied M. Nicollet, a Frenchman and a distinguished man of science, in explorations of the country between the Missouri and the British line. These explorations were made under the authority of the government, and while engaged in them in 1838, Fremont received from President Van Buren, under date of July 7, a commission as 2d lieutenant in the corps of topographical engineers. While at Washington in 1840, employed in the preparation of the report of these expeditions, Fremont became acquainted with Miss Jessie Benton, a daughter of Col. Thomas H. Benton, at that time a senator from Missouri. An engagement was formed, but as the lady was only 15 years of age, her parents, notwithstanding their high personal regard for Fremont, objected to the match, and suddenly, probably through the potent influence of Col. Benton, the young officer received from the war department a peremptory order to make an examination of the river Des Moines upon the western frontier. The survey was rapidly executed, and shortly after his return from this duty the lovers were secretly married, Oct. 19, 1841. In the following year Fremont projected a geographical survey of the entire territory of the United States from the Missouri river to the Pacific ocean, the feasibility of an overland communication between the two sides of the continent being a leading idea in his scheme of explorations. He accordingly applied to the war department for employment on this service, and having received, at his own suggestion, instructions to explore the Rocky mountains, and particularly to examine the South pass, he left Washington, May 2, 1842, and on June 10 began his expedition from a point near the mouth of the Kansas, a few miles beyond the Missouri border, whence he proceeded up the Platte river and its tributaries, through bands of hostile Indians, to the South pass, which was carefully examined. He next explored the Wind River mountains, the loftiest peak of which, 13,750 feet above the sea, he ascended, Aug. 15, accompanied by 4 of his men. This mountain is now called Fremont's peak. From the Wind River mountains, which he left Aug. 18, Fremont returned to his starting place by nearly the same route that he had followed in going out. He reached the mouth of the Kansas, Oct. 10, 1842, after an absence of 4 months. He had encountered much hardship and many perils, and had successfully accomplished all the objects of the expedition. Over the whole course of his extended route he had made barometrical observations to ascertain the elevations both of the plains and of the mountains, and astronomical observations for latitudes and longitudes. The face of the country was noted as fertile or sterile, the practicability of routes was settled, military positions indicated, and large contributions made to geology and botany. His report of the expedition was laid before congress in the winter of 1842–'3. It attracted great attention both at home and abroad. It was praised by Humboldt in his "Aspects of Nature," and the London "Athenæum" pronounced it one of the most perfect productions of its kind. Immediately after the publication of his report Fremont planned a second expedition of a much more comprehensive character than the first. He determined to extend his explorations across the continent, and to survey the then unknown region lying between the Rocky mountains and the Pacific ocean. In May, 1843, he commenced his journey with 39 men, and, in pursuance of his instructions, proceeded up the Kansas river far enough to ascertain its character, and then crossed over to the Platte, which he ascended to its source in the mountains, where the Sweet Water, one of its tributaries, springs from the neighborhood of the South pass. He reached the pass on Aug. 8, went through it, and saw the head waters of the Colorado flowing toward the gulf of California. On Sept. 6, after travelling over 1,700 miles, he came in sight of the Great Salt lake, of which no accurate account had ever been given, and of which very vague and erroneous notions were entertained. His investigations effected important rectifications in our geographical knowledge of this portion of the continent, and had subsequently a powerful influence in promoting the settlement of Utah and of the Pacific states. From the Salt lake he proceeded to the upper tributaries of the Columbia river, whose valley he descended till on Nov. 4 he reached Fort Vancouver, near the mouth of the Columbia. On Nov. 10 he set out on his return to the states. He selected a S. E. route, leading from the lower part of the Columbia to the upper Colorado, through an almost unknown region, crossed by high and rugged mountain chains. He soon encountered deep snows, which impeded his progress and forced him to descend into the great basin, and presently found himself in the depth of winter in a desert, with the prospect before him of death to his whole party from cold and hunger. By astronomical observation he found that he was in the latitude of the bay of San Francisco, but between him and the valleys of California was a range of mountains covered with snows which the Indians declared no man could cross, and over which no reward could induce them to attempt to guide him. Fremont boldly undertook the passage without a guide, and accomplished it in 40 days, reaching Sutter's Fort on the Sacramento early in March, with his men reduced almost to skeletons, and with only 33 out of 67 horses and mules remaining, and those that survived so weak and thin that they could barely walk while led along. He resumed his journey March 24, and proceeding southward, skirted the western base of the Sierra Nevada, crossed that range through a gap, entered the great basin, and again visited the Salt lake, from which through the South pass he re-

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turned to Kansas in July, 1844, after an absence of 14 months, during the greater part of which he was never out of sight of snow. The reports of this expedition occupied in their preparation the remainder of 1844. Fremont was brevetted captain in Jan. 1845, and in the spring of that year he set out on a third expedition to explore the great basin and the maritime region of Oregon and California. The summer was spent in examining the head waters of the rivers whose source is in the dividing ridge between the Pacific and the Mississippi valley, and in October he encamped on the shores of the Great Salt lake. From thence he proceeded to explore the Sierra Nevada, which chain he crossed again in the dead of winter with a few men to obtain supplies from California for his party, with whom, after perilous adventures among the mountains and some successful encounters with hostile Indians, he made his way into the valley of the San Joaquin, where he left his men to recruit, and went himself to Monterey, which was at that time the capital of California, to obtain from the Mexican authorities permission to proceed with his exploration. Permission was granted, but was almost immediately revoked, and he was peremptorily ordered to leave the country without delay. Fremont as peremptorily refused to comply. His men, exhausted by the hardships they had suffered and destitute of supplies and animals, were in no condition to repass the mountains and the deserts from which they had just emerged. The Mexican governor, Gen. Castro, mustered the forces of the province and prepared to attack the Americans, who were only 62 in number. Fremont took up a strong position on the Hawk's peak, a mountain 30 m. from Monterey, built a rude fort of felled trees, hoisted the American flag, and, having plenty of ammunition, resolved to defend himself. He wrote to the American consul at Monterey, in reply to a private message, March 10, 1846: "We have in no wise done wrong to the people or the authorities of this country, and if we are hemmed in and assaulted here, we will die, every man of us, under the flag of our country." The Mexican general formed a camp with a large force of artillery, cavalry, and infantry, in the plain immediately below the position held by the Americans, whom he hourly threatened to attack. On the evening of the 4th day of the siege, Fremont, tired of inaction, withdrew with his party and proceeded toward the San Joaquin. The fires were still burning in his deserted camp when a messenger arrived from Gen. Castro to propose a cessation of hostilities. Without further molestation Fremont pursued his way northward through the valley of the Sacramento into Oregon. Near Tlamath lake, on May 9, he met a party in search of him with despatches from Washington, directing him to watch over the interests of the United States in California, there being reason to apprehend that the province would be transferred to Great Britain. There was also reason to believe that Gen. Castro intended to destroy the American settlements on the Sacramento. Fremont promptly retraced his steps to California. Gen. Castro was already marching against the settlements. The settlers rose in arms, flocked to Fremont's camp, and under his leadership the result was that, in less than a month, as Col. Benton says in his "Thirty Years' View:" "All the northern part of California was freed from Mexican authority, independence proclaimed, the flag of independence raised, Castro flying to the south, the American settlers saved from destruction, and the British party in California counteracted and broken up in all their schemes." On July 4 Fremont was elected governor of California by the American settlers; and on the 10th of that month he learned that Commodore Sloat, who commanded the U. S. squadron on the coast, had taken possession of Monterey. Fremont proceeded to join the naval forces, and reached Monterey with his 160 mounted riflemen on the 19th. Commodore Stockton about the same time arrived at Monterey with the frigate Congress, and took command of the squadron with authority from Washington to conquer California. At his request Fremont, who had now, May 27, 1846, been promoted to the rank of lieutenant-colonel, organized a force of mounted men, known as the "California battalion," of which he was appointed major. He was also appointed by Com. Stockton military commandant and civil governor of the territory, the project of making California independent having been relinquished on receipt of intelligence that war had broken out between the United States and Mexico. He was actively employed for some time in suppressing insurrections of the Mexican inhabitants, and in averting by his personal influence a war with the Walla-Walla Indians. On Jan. 13, 1847, he concluded with the Mexicans articles of capitulation which terminated the war in California, and left that country permanently in the possession of the United States. Meantime Gen. Kearney of the U. S. army, with a small force of dragoons, had arrived in California. A quarrrel soon broke out between him and Com. Stockton as to who should command. They each had instructions from Washington to conquer and organize a government in the country. Fremont had accepted a commission from Com. Stockton as commander of the battalion of volunteers, and had been appointed governor of the territory. Gen. Kearney, as Fremont's superior officer in the regular army, required him to obey his orders, which conflicted with those of Com. Stockton, whose authority Fremont had already fully recognized as commander-in-chief of the territory—an authority which had also been admitted by Gen. Kearney for a considerable period after his arrival. In this dilemma Fremont concluded to obey the orders of Com. Stockton. Despatches from Washington received in the spring of 1847 at length terminated this conflict of authorities by

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directing Com. Stockton to relinquish to Gen. Kearney the supreme command in California. Fremont hesitated no longer to place himself under Gen. Kearney's orders, who, however, treated him with marked aversion, and refused him permission to join Gen. Taylor's army, then serving in northern Mexico. In June, 1847, Gen. Kearney set out overland for the United States, ordering Fremont to accompany him, and treating him with deliberate disrespect throughout the journey, until at Fort Leavenworth, Aug. 22, 1847, he put him under arrest, and directed him to repair to Washington and report himself to the adjutant-general. On his way to Washington, passing through St. Louis, a large number of the most respectable citizens addressed him a letter recapitulating his claims to public admiration for his geographical explorations and military operations, and inviting him to a public dinner. This honor he declined under the circumstances of his arrest, and arrived at Washington Sept. 16. He found letters there informing him that his mother was dying in South Carolina. Obtaining leave of absence, in 3 days he reached Charleston. His mother died a few hours before he reached her residence. Immediately on his arrival at Washington, Fremont asked for a speedy trial on Gen. Kearney's charges, and accordingly a court martial was held, beginning Nov. 2, 1847, and ending Jan. 31, 1848, which found him guilty of "mutiny," "disobedience of the lawful command of a superior officer," and "conduct to the prejudice of good order and military discipline," and sentenced him to be dismissed from the service. A majority of the members of the court recommended him to the clemency of President Polk. The president refused to confirm the verdict of mutiny, but approved the rest of the verdict and the sentence, of which, however, he immediately remitted the penalty. Fremont promptly declined to avail himself of the president's pardon, alleging as a reason: "I do not feel conscious of having done any thing to merit the finding of the court; and this being the case, I cannot, by accepting the clemency of the president, admit the justice of the decision against me." He accordingly forthwith resigned his commission as lieutenant-colonel. The friends of Col. Fremont and a large portion of the public considered this court martial and the charges that led to it as an attempt, in the language of one of his biographers, "instigated by professional and personal jealousy to break down the character and to ruin the prospects of an aspiring and deserving rival." On Oct. 14, 1848, Fremont started upon a 4th expedition across the continent, at his own expense. With 33 men and 120 mules he made his way along the upper waters of the Rio Grande through the country of the Utahs, Apaches, Comanches, and other Indian tribes, then at war with the United States. His object was to find a practicable passage by this route to California. In attempting to cross the great Sierra, covered with snow, his guide lost his way, and Fremont's party encountered horrible suffering from cold and hunger, a portion of them being driven to cannibalism to sustain life. All of his animals and one third of his men perished, and he was forced to retrace his steps to Santa Fé. Undaunted by this disaster, he gathered around him another band of 30 men, and after a long search discovered a secure route, which conducted him eventually to the Sacramento in the spring of 1849. He now determined to settle in California, where in 1847 he had bought the Mariposas estate, a very large tract of land, containing rich gold mines. His title to this estate was contested, but after a long litigation it was decided in his favor in 1855 by the supreme court of the United States. In 1849 he received from President Taylor the appointment of commissioner to run the boundary line between the United States and Mexico. Regarding this appointment as intended to signify Gen. Taylor's disapproval of the court martial which had dismissed him from the army, he accepted it to show his sense of the value of the good opinion of that distinguished soldier. The legislature of California, which met in Dec. 1849, elected him on the first ballot one of the two senators to represent the new state in the senate of the United States. He consequently resigned his commissionership, and departed at once for Washington by way of the isthmus. He took his seat in the senate, Sept. 10, 1850, the day after the admission of California as a state. In drawing lots for the terms of the respective senators, Fremont drew the short term, ending March 3, 1851. The senate remained in session but three weeks after the admission of California, and during that period Fremont devoted himself almost exclusively to measures relating to the interests of the state he represented. For this purpose he introduced and advocated a comprehensive series of bills, 18 or 20 in number, embracing almost every object of legislation demanded by the peculiar circumstances of California. On Sept. 12 he voted against Mr. Seward's amendment providing for the abolition of slavery in the district of Columbia, which, however, only received 5 votes; on the 14th he voted against an amendment providing that if a free person in the district of Columbia should induce a slave to run away, or should harbor a fugitive slave, he should be imprisoned in the penitentiary 5 years; on the 16th he voted for the bill suppressing the slave trade in the district; he also voted against an amendment authorizing the corporations of the district to prohibit free negroes within their limits. Fremont returned to California in the first steamer that sailed after the adjournment of Congress; he was prevented from returning to Washington next session by a severe attack of fever contracted upon the isthmus. In the state election of 1851, in California, the party which had opposed the introduction of slavery, and had placed the proviso against it in the state constitution, was defeated. As Fremont was one of the

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leaders of this party, he failed of reëlection to the senate, after 142 ballotings in the state legislature. The next 2 years he devoted to his private affairs, and visited Europe in 1852, where he spent a year, and was received with distinction by many eminent men of letters and of science. In 1850, while he was in the senate, Baron Humboldt, on behalf of the king of Prussia, had sent him "the great golden medal for progress in the sciences." At the same time the geographical society of Berlin elected him an honorary member. A few months earlier the royal geographical society of London had awarded him the "founder's medal" for his "preëminent services in promoting the cause of geographical science." While in Europe he learned that congress had made an appropriation for the survey of 3 routes from the Mississippi valley to the Pacific. He immediately returned to the United States for the purpose of fitting out a 5th expedition on his own account to complete the survey of the route he had taken on his 4th expedition. He left Paris in June, 1853, and in September was already on his march across the continent. The result of this 5th expedition was satisfactory. He found passes through the mountains on the line of lat. 38° and 39° N., and reached California in safety, after enduring great hardships. For 50 days his party lived on horse flesh, and for 48 hours at a time were without food of any kind. In the spring of 1855 Fremont with his family took up his residence in New York, for the purpose of preparing for publication the narrative of his last expedition. His name now began to be mentioned in connection with the presidency by those who were combining to act against the democratic party on the basis of opposition to the extension of slavery. In April, 1856, he was invited to attend a meeting in New York of those who opposed the Kansas policy of President Pierce. In his letter of reply he said: "I heartily concur in all movements which have for their object to repair the mischiefs arising from the violation of good faith in the repeal of the Missouri compromise. I am opposed to slavery in the abstract and upon principle, sustained and made habitual by long-settled convictions. While I feel inflexible in the belief that it ought not to be interfered with where it exists, under the shield of state sovereignty, I am as inflexibly opposed to its extension on this continent beyond its present limits." The republican national convention, which met at Philadelphia, June 17, 1856, deeming this letter satisfactory, nominated Fremont for the presidency by a vote of 359 to 196 for John McLean, on an informal ballot. On the first formal ballot Fremont was unanimously nominated. He accepted the nomination in a letter dated July 8, 1856, in which he expressed himself strongly against the extension of slavery and in favor of free labor. A few days after the Philadelphian convention adjourned, a national American convention at New York also nominated Fremont for the presidency. He accepted their support in a letter dated June 30, in which he referred them for an exposition of his views to his forthcoming letter accepting the republican nomination. After a most spirited and exciting contest, the presidential election resulted in the choice of Mr. Buchanan by 174 electoral votes from 19 states, while Fremont received 114 votes from 11 states, including the 6 New England states, New York, Ohio, Michigan, Iowa, and Wisconsin. Maryland gave her 8 electoral votes for Mr. Fillmore. The popular vote for Fremont was 1,341,514; for Buchanan, 1,838,232; for Fillmore, 884,707. In 1858 Mr. Fremont returned to California, where he has since resided.

FREMONT, a S. W. co. of Iowa, bordering on Missouri, and bounded W. by the Missouri river, which separates it from Nebraska; area, about 500 sq. m.; pop. in 1856, 3,368. It has a rich soil and a diversified surface with extensive prairies and timber land, watered by Nishnabatona river. The productions in 1856 were 1,088 tons of hay, 12,460 bushels of wheat, 9,614 of oats, 306,448 of Indian corn, 13,166 of potatoes, and 45,806 lbs. of butter. In 1855 the county contained a carding machine, 7 saw mills, 2 grist mills, 3 or 4 churches, and about 20 public schools. It was named in honor of Col. J. C. Fremont. Capital, Sidney.

FRENCH BROAD RIVER, a river of North Carolina and Tennessee, rising in Henderson co. of the former state, near the foot of the Blue Ridge, flowing N. W. into Tennessee, bending toward the S. W., and discharging into Holston river, 4 m. above Knoxville. It is about 200 m. long, and is navigable by steamboats as far as Dandridge. For about 40 m. from Ashville to the Tennessee line, it is remarkable for its beautiful scenery, flowing through deep mountain gorges, or overhung by high cliffs. Nearly opposite the Warm Springs, in Buncombe co., N. C., are precipices known as the Chimneys and the Painted Rocks. The latter, which are between 200 and 300 feet high, derive their name from some Indian pictures still to be seen on them.

FRENCH HORN. See Horn.

FRENCH POLISH, a varnish made by dissolving some resinous substance, as shell lac, copal, or mastic, in alcohol, and designed for polishing the flat surfaces of furniture by being rubbed in with soft rubbers made for the purpose. Almost every maker of it has his own recipe, by which it appears that the proportions of the resin or even the kinds used are not essential. Some add dragon's blood or other coloring matter to give a dark tint to it, while others prefer it colorless. The consistency is reduced to the fancy of the operator by adding more alcohol after the solution is made. In its use the surface of the wood is first well smoothed with sand paper. The rubber, which may be a small ball of clean cotton covered with a linen rag, is then moistened with the varnish by laying it upon the mouth of the bottle and inverting

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this upon it. Another rag is then laid over it and wet with 2 or 3 drops of linseed oil. As this is moved over the wood with free circular sweeps and light pressure, the varnish exudes through the rag and is evenly spread over the surface, the supply being regulated by the pressure of the hands. Care is required not to lift the rubber directly from the work, but to sweep it off, as in blending with a brush. In a few moments the outer rag becomes clogged so that the polish cannot pass freely through; it is then necessary to renew it. The rubbers are often thrown away and replaced with new ones, as they become hard and liable to scratch the work. When the grain of the wood appears to be uniformly filled up it is left to harden for an hour or two, and is then smoothed down with very fine sand paper. These processes are repeated till the wood appears uniformly bright and smooth. The cloudy marks may be removed by gently rubbing with a clean rubber and rag, the latter moistened with a few drops of alcohol—the rubbing being first in circular sweeps, and ending in straight strokes passing in the direction of the grain of the wood. After drying a few days, the work should be again rubbed with the finest sand paper, and then polished with varnish of the thinnest consistency.—A polish recommended as preferable to the above on account of not being injured by water, and better covering any stains or scratches in the wood, is thus prepared. Three or four pieces of sandarach of the size of a small egg are boiled with a bottleful of linseed oil, rendered drying by litharge or other drier, for an hour, and while cooling a teaspoonful of Venice turpentine is gradually added. If too thick, spirits of turpentine may be used to thin it. After rubbing it on the furniture and exposing it a short time to the sun, it is to be rubbed off. Every day the wood should be rubbed, and in 8 or 10 days the polish should be again applied, and afterward once in one or two months.

FRENEAU, Philip, an American poet and journalist, born in New York, Jan. 13, 1752, died near Freehold, N. J., Dec. 18, 1832. He was of Huguenot descent, and was educated at Nassau hall, N. J., where James Madison was his room-mate and intimate personal friend. As a boy he showed considerable satirical power and facility in versification, and while at college wrote the "Poetical History of the Prophet Jonah," in 4 cantos. It was his first intention to study law, but he finally engaged in a seafaring life. During the war of the revolution his pen was busy on the patriotic side, and his political burlesques in prose and verse were widely circulated and relished. Some of his verses, descriptive of memorable events on land and sea, are genuine specimens of the national ballad. In 1780 he was captured by a British cruiser while on his way to the West Indies, and was subjected to a long and cruel confinement on board the Scorpion prison ship in New York harbor, which he has commemorated in his poem entitled the "British Prison Ship." For several years after the war he was employed alternately as newspaper editor and sea captain. Upon the establishment of the federal government at Philadelphia he was appointed French translator in the department of state under Mr. Jefferson, and at the same time became editor of the "National Gazette," which was made the vehicle of bitter attacks upon the administration of Gen. Washington. It is doubtful, however, whether Freneau is responsible for all the articles on this subject. According to his own statement, the most severe of the series were written or dictated by Jefferson. The paper was discontinued in Oct. 1793, and in 1795 Freneau started a newspaper near Middletown Point, N. J., which he continued for a year, and printed there an edition of his poems. Then, after editing for a year "The Time Piece," a tri-weekly sheet, which he established in New York, devoted to belles lettres and general news, he resumed his old employment as master of a merchant vessel. The second war with Great Britain reanimated his muse, and he recorded in stirring verse the triumphs of the American arms. The remainder of his life was spent in retirement at his residence in New Jersey, with frequent visits to Philadelphia and New York, where his acquaintance with eminent statesmen and authors was extensive. He lost his life by exposure and cold, while going on foot in the night during a snow storm to his residence near Freehold. Freneau, although little known to the present generation, was a true poet and an able writer of essays and political articles. His poems embrace all the popular forms of composition, and show considerable skill in versification. His humor is illustrated in his numerous satirical poems, and in the political squibs which he so readily threw off. Many of his smaller poems possess great elegance of diction, and 50 years ago were favorites throughout the country. Campbell and Scott did not scruple to borrow whole lines from him, and Jeffrey predicted that the time would come when his poetry, like "Hudibras," would command a commentator like Grey. Several editions of Freneau's poems were published during his life, but they have been long out of print.

FRERE, John Hookham, an English poet and diplomatist, born in 1769, died in Malta, Jan. 7, 1846. He was educated at Eton, and while a school boy translated the remarkable war song upon the victory of Athelstan at Brunnenburg from the Anglo-Saxon of the 10th century into the Anglo-Norman of the 14th. It is found in the first volume of Ellis's "Specimens of the Early English Poets," and Scott affirmed that of all the modern poems that had been produced as ancient, this was the only one that he had seen which could not have been detected on internal evidence. When a school boy at Eton in connection with Canning and Robert Smith he started and carried on to 40 numbers a weekly paper called the "Microcosm." He entered parliament in 1796, succeeded Canning as under-secretary for foreign affairs in 1799, and

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was minister plenipotentiary in Spain in 1818–'19. He afterward filled other diplomatic stations in Portugal and Prussia, and during his leisure made exquisite translations from the Greek and Spanish, for which Prof. Wilson classed him with Coleridge, styling them the two most perfect versifiers of the time. In 1817 he published an extravaganza of the Pulci and Casti school, under the title of Whistlecraft's "Prospectus and Specimen of an Intended National Poem" (also called the "Monks and the Giants"), which treated in a light and satirical way the adventures of King Arthur. Its peculiar stanza and sarcastic pleasantry formed the immediate exemplar of Byron in his "Beppo" and "Don Juan." Frere united with Canning, Ellis, and Gifford, as a contributor to the "Anti-Jacobin," and was one of the founders of the London "Quarterly Review." For many years before his death he resided in Malta, receiving from the government a liberal diplomatic pension.

FRÉRET, Nicolas, a French scholar, born in Paris, Feb. 15, 1688, died in the same city, March 8, 1749. Admitted in 1714 to the academy of inscriptions and belles lettres, of which he was afterward perpetual secretary, he was imprisoned for his first memoir, which discussed the origin of the French. On recovering his liberty in 1715, he began to produce the long series of memoirs which gave him distinction as a chronologist, geographer, philosopher, mythologist, and philologian. The annals of the Assyrians, Chaldeans, Egyptians, and Indians, the principal ancient and oriental cosmogonies and theogonies, and numerous questions of history and geography are among the objects of his research. He wrote on chronology against Newton. An incomplete collection of his works was made by Leclerc de Septchênes (20 vols., Paris, 1796–'99). A more complete edition was undertaken by Champollion-Figeac (Paris, 1825), but only the first volume was issued.

FRÉRON, Élie Catherine, a French critic and journalist, born in Quimper in 1719, died in Paris, March 10, 1776. He studied under the Jesuits in the college of Louis le Grand at Paris, in which he was for a short time professor. At the age of 20 he joined Desfontaines in conducting his journal of criticism, and in 1746, after the death of the latter, commenced a periodical of similar character entitled *Lettres à Madame la Comtesse de * * **. This was suppressed in 1749, but resumed under the title *Lettres sur quelques écrits de ce temps*, in which he was associated with the abbé de La Porte. This was succeeded in 1754 by *L'année littéraire*, which Fréron conducted alone, and which was the chief foundation of his reputation. In this he showed himself a passionate admirer of the age of Louis XIV., and a decided adversary of the new philosophical and literary doctrines. His invectives produced against him the most violent hatred, and the rest of his life was a warfare with the encyclopædists. Throughout the literary history of the time his name is inseparable from that of Voltaire, who was stung to madness by the passionless satires which appeared weekly in *L'année littéraire*. Fréron never missed an opportunity to attack him, and Voltaire repaid him with equal malice. He stops in the midst of a grave historical discussion to insult Fréron; he assails him in his most dignified tragedies, in *La pucelle* and *Candide;* he hurls against him the philippic of *Le pauvre diable*, and in the comedy of *L'Écossaise* calls his journal *L'âne littéraire*. Fréron sustained the conflict alone, and large volumes might be collected of epigrams and satires by men of genius of which he was the object; yet though he was defeated at last, and died in grief for the suppression of his journal, he is now remembered as one of the calmest observers and keenest analyzers of the society of his time, as a man of admirable taste, and the fonnder of newspaper criticism in France.—Louis Stanislas, a French revolutionist, son of the preceding, born in Paris in 1765, died in St. Domingo in 1802. A schoolfellow of Robespierre and Camille Desmoulins, he became one of the most fervent of the revolutionary party, and published a ferocious newspaper, *L'orateur du peuple*. He was at the same time a member of the club of Cordeliers. On the flight of the king to the frontier, he insisted upon his deposition, and afterward participated in the insurrection of Aug. 10, and in the slaughters of Sept. 1792. He was now elected to the convention, where he took his seat among the Montagnards; he voted for the king's death, and contributed to the fall of the Girondists. Being appointed one of the commissaries of the convention sent with the army against Marseilles and Toulon, he signalized himself by such brutalities that he was censured even by the committee of public safety. After the death of Danton, he sided with the Thermidorians against Robespierre, and in conjunction with Barras commanded the troops who arrested the dictator and his adherents at the *hôtel de ville*. He now unrelentingly pursued the members of the committee of public safety, procured the condemnation of Fouquier-Tinville, became the chief of a reactionary band of young men known as *la jeunesse dorée*, was instrumental in suppressing the Jacobins, and energetically opposed all attempts at insurrection. Under the directory, he was sent to the south on a mission of peace; but his former cruelties were still remembered by the people. He was on the point of committing bigamy by marrying Pauline Bonaparte, the sister of the first consul, when his wife came forward and prevented the match. He accepted an appointment as subprefect in the island of St. Domingo, and soon after his arrival there was carried off by the yellow fever.

FRESCO PAINTING (Ital. *fresco*, fresh), a method of ornamenting the walls and ceiling of buildings by painting designs in colors ground in water and mixed with lime upon the freshly laid plaster. This art was a favorite one with

the ancient Greeks, and was practised by other nations of antiquity. Their work, as described by Vitruvius, was frequently done upon stucco, which was prepared with extreme care, in order that the paintings should receive the most delicate finish and be of the most permanent nature. But with the moderns the common plaster of lime and sand is preferred for a foundation; it is longer in setting and gives a softer effect to the painting. This style of painting was much practised by the most celebrated Italian artists, and the walls of many of the Italian palaces, churches, and convents are still adorned with the works designed by their hands. The outlines of the designs are first executed upon thick paper attached to cloth, which is stretched upon a frame. These are called cartoons, from the Italian *cartone*, pasteboard. The famous cartoons of Raphael, designs that have never been surpassed in beauty by the work of man's hands, were of this character, made to be copied in tapestry, though equally suitable to be applied to the decoration of walls by fresco painting. The cartoons serve to give copies upon tracing paper, and these being attached to the wall in portions of convenient size, the outline is transferred to the wet plaster by going over the lines with a sharp point. Other methods of transfer are, however, in use; as covering the back of the design with black lead or some other coloring matter, applying this to the wall, and then going over the face of the drawing with a point; and still another method is to prick the figures through the cartoon, sometimes upon a separate sheet laid behind it, and then, placing either the cartoon itself or the duplicate sheet upon the plaster, to dust through the holes from a muslin bag a black coloring matter, which attaches itself in the lines of the figures to the walls. However, many of the great painters have worked immediately on the plaster without the intervention of any guide whatever. The preparation of the walls is still an object of especial care. All the mortar should be fresh work, and of clean sand and good lime. When the rough coat is perfectly dry and hard, the smoother layers are added of the most carefully prepared mortar. In Munich this lime is sometimes slaked 2 or 3 years before it is used, being kept, after thorough stirring and reduction to an impalpable consistency, in a pit covered with clean sand a foot or more in thickness, over which earth is laid. Pure rain or distilled water should be used in mixing it, and also perfectly clean sand. The rough coat being dampened till it will absorb no more water, the finer plaster is laid on, and when this begins to set, a still finer coat is applied containing a smaller proportion of sand. Before this dries, the design must be transferred and the painting completed; consequently but small portions can be plastered at a time. The drying may be checked by occasional sprinkling with water, or, as is sometimes practised, by keeping wet sheets pressed to the design, as it is attached to the wall. The lines between the work of one day and that of the next are made to come in portions of the painting where they will be concealed by the colors. As any retouching of the work is impracticable, it is necessary that it should be executed skilfully at once, and the painter must also work rapidly before the ground becomes too dry and hard to take the colors. If others are afterward applied mixed up with size, white of egg, or gum, they do not long continue to harmonize with the rest of the work. The colors must be of substances not liable to be affected by contact with the lime; and those of a mineral nature are consequently almost exclusively used. Lime prepared in the manner described as practised at Munich, or the dust of white marble, makes a good white. Chrome, the ochres, verditer, lapis lazuli, &c., furnish many of the colors. The brushes must be so soft as not to roughen the plaster surface.—In addition to the process above described, which was called by the Italians *buon fresco*, or the true fresco, the early masters had other methods of painting on lime or plaster, to which the general name of fresco is usually applied. The most important of these was that known as *fresco sicco*, or dry fresco, so called because the plastering, having been allowed to dry thoroughly, was remoistened before the color was applied, whereby the artist was enabled to quit or resume his work at pleasure, and to avoid the joinings observable in the true fresco painting. This process was universal in Italy until the close of the 14th century, when *buon fresco* in a measure took its place. In this style were probably executed the paintings in Pompeii and Herculaneum. Sometimes also the masses of color were laid upon the wet plaster, and the picture was subsequently finished in *fresco sicco* or *tempera*.—A new method of preparing the wall and painting in fresco has been introduced into Germany by Prof. Von Fuchs, called the stereochrome. The wall is coated with a preparation of clean quartz sand mixed with the least possible quantity of lime; and after the application of this the surface is scraped to remove the outer coating in contact with the atmosphere. It is then washed with a solution of silica, prepared with silica 23.21 parts in 100; soda 8.90; potash 2.52; water 65.37. The wall is thus said to be fixed; and if too strongly fixed, must be rubbed with pumice. As the painter applies his colors he moistens the work by squirting distilled water upon it. When finished it is washed over with the silica solution. The picture also, as it is in progress, is washed with the same solution, and the colors thus becoming incorporated in the flinty coating, the picture is rendered hard and durable as stone itself. In this process the artist may leave the work and return to it at any time, and he is also able to retouch and alter any portions of it he may see fit. The new museum at Berlin has been recently adorned by this process by Kaulbach. The decorations are historical pictures, the dimensions of which are 21 feet in height and 24½ in width; and single colossal figures, friezes,

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arabesques, &c. They have the brilliancy and vigor of oil paintings, with no dazzling effect from whatever direction in regard to the light they may be viewed.—Ancient paintings in fresco have been transferred from walls crumbling by decay to canvas, and thus preserved. The wall being thoroughly cleaned, cloth is glued to it, and successive layers are added and glued on. When quite dry the whole is torn off, taking the fresco with it. Cloth is now attached with stronger glue to the back of the fresco, and the adherence of the layers on the other side is loosened by the continued application of warm water, until they are all removed and the painting is left upon the cloth at its back. Such was the process successfully employed in removing and preserving the paintings on the old walls of the convent of Sta. Eufemia at Brescia in 1829.—The history of fresco painting during the first two centuries after the revival of art is a history of art itself, as nearly every considerable work was executed by that process. As a means of conveying thoughts, ideas, and information, not then, as now, acquired through literature, it continued to subserve a useful purpose even after the invention of printing. Hence the early masters, laboring for the edification of men in general, and not for the gratification of individuals—or, to adopt the language of the ancient fraternity of the painters of Sienna, "being teachers to ignorant men, who know not how to read, of the miracles performed by virtue and in virtue of the holy faith"—rarely painted easel pictures, but lavished all their genius and thought upon mural decoration or fresco painting. As late as the latter half of the 16th century Vasari declares it to be "more masterly, noble, manly, secure, resolute, and durable than any other kind of painting;" and he records the opinion of Michel Angelo that fresco was fit for men, oil painting only for women, and the luxurious and idle. The abbey church of St. Francis in Assisi, near Perugia, witnessed the first development of fresco painting in modern times. About the middle of the 13th century Giunta of Pisa commenced a series of paintings on its walls, and during the next two centuries Cimabue, Giotto, Taddeo Gaddi, Simone Memmi, and nearly every other painter of note, were invited to add to its adornment. Neglect and exposure have injured these works, but as the earliest specimens of modern Christian art, they still possess an absorbing interest. Next in date to these, and of far greater importance, are the decorations of the Campo Santo in Pisa, a burial ground, about 400 feet in length by 118 in breadth, enclosed by high walls with an arcade something like the cloisters of a monastery running all around it. It was completed about 1285, and until the close of the 15th century its walls employed the services of some of the chief masters of fresco. The early paintings by Buffalmacco, Giotto, and others, have nearly disappeared, and time, neglect, and damp have seriously impaired the effect of the others; but efforts are now making to restore them, or to arrest the progress of decay. A series painted by Orcagna about 1335, representing the last judgment, hell, and other subjects according with the character of the place, are considered among the grandest specimens of early art. After him came Simone Memmi, Taddeo Gaddi, Francesco da Volterra, Antonio Veneziano, and others, whose labors extended to the close of the century. The wars and internal dissensions which distracted Pisa subsequently interrupted the decoration of the Campo Santo for many years; but tranquillity having been restored, Benozzo Gozzoli was invited in 1468 to complete the work. The whole of the north wall, 400 feet in length, was assigned to him, and in the course of the next 16 years he covered this immense space with a series of frescoes representing the principal events in the Old Testament—*un' opera terribilissima*, as Vasari calls it. Beside the works enumerated as belonging to the 14th century, we may mention Giotto's celebrated series in the Arena chapel at Padua, representing scenes from the life of the Virgin, and the same master's recently discovered portraits of Dante and other Florentine citizens in the chapel of the Bargello at Florence; the series by Taddeo Gaddi and Simone Memmi in the Spanish chapel in the church of Sta. Maria Novella, Florence, representing the "Triumph of the Church;" Spinello's "Overthrow of the Rebel Angels" in the convent of S. Agnolo, at Arezzo; and the series representing the "Fruits of Good Government and the Triumph of Peace," painted by Ambrosio Lorenzetti in the Palazzo Publico of Sienna. In the 15th century, to which belongs what has been called the *renaissance* or new birth of art, increased wealth and intelligence, the result of greater political and religious freedom, caused an increased demand for easel pictures, the value of which was greatly enhanced by the introduction of oil as a medium for mixing colors; but fresco painting still maintained its supremacy, and claimed for its function the religious and moral teaching of the people, and the representation of sacred history. The noblest achievements in art are therefore still those of the fresco painters. The great names of the century are Pietro della Francesca, of whose frescoes in the church of S. Francesco, in Arezzo, Vasari says that "they might be called too beautiful and excellent for the time in which they were painted;" Masolino; Filippo Lippi, who painted the frescoes in the Duomo at Prato; Fra Angelico da Fiesole; Masaccio, whose series of the life of St. Peter in the Brancacci chapel in the church of Sta. Maria del Carmine, in Florence, to which additions were afterward made by Filippino Lippi, formed an epoch in art; and Ghirlandaio, the master of Michel Angelo, whose frescoes representing the histories of John the Baptist and the Virgin afforded models for Leonardo da Vinci, Raphael, and Michel Angelo. Luca Signorelli, Andrea Mantegna, the great founder of the Mantuan school, Francesco Francia, who decorated the

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church of St. Cecilia in Bologna, Perugino, the master of Raphael, Fra Bartolommeo, and some others, belong partly to this century and partly to the next, which witnessed at once the culmination of the art of fresco painting, its corruption and decline. The 3 most illustrious painters of this latter era, Leonardo da Vinci, Michel Angelo, and Raphael, embodied their loftiest conceptions on the walls and ceilings of churches and palaces, and their numerous disciples filled all Italy with imitations, degenerating toward the close of the century into lifeless mannerisms. Leonardo's chief work is the well known "Last Supper," executed for the refectory of the convent of Sta. Maria delle Grazie at Milan, and of which only the mouldering remains are now visible. It has been called the most perfect work executed since the revival of painting. Of Michel Angelo's frescoes, the most famous are the series on the ceiling of the Sistine chapel, representing the "Creation" and the "Fall of Man," with the grand figures of the prophets and sibyls, and the "Last Judgment," on the end wall of the chapel—the whole combining to a degree never since equalled grandeur of form and sublimity of expression. In simple beauty and severe dignity, as well as in their technical excellences, Raphael's frescoes perhaps exhibit the highest development of Christian art. The most famous are those covering the walls and ceilings of the chambers in the Vatican, known as the "Stanze of Raphael," although many of these works, as well as the decorations of the *loggie* or open colonnades of the Vatican, were painted by Giulio Romano and other scholars of Raphael from his designs. Raphael's hand is seen chiefly in the series of "Theology" or the "Dispute of the Sacrament," "Philosophy" or the "School of Athens," "Poetry" or "Parnassus," and "Jurisprudence," in the Camera della Segnatura, and in the "Expulsion of Heliodorus from the Temple," the "Mass at Bolsena," "Attila," and the "Delivery of St. Peter," in the stanza of Heliodorus. He also painted the 4 celebrated sibyls in the Chigi chapel in the church of Sta. Maria della Pace, and the "Galatea" in the Farnesina villa in Rome. The frescoes in the Vatican having suffered by neglect were skilfully restored by Carlo Maratti in the last century. Giulio Romano also painted the well known "Fall of the Giants" in the Palazzo del Te at Mantua. Shortly after the completion of the works in the Vatican, Correggio painted in the church of S. Giovanni in Parma his fresco of the "Ascension," and that of the "Assumption" in the Duomo of the same city, in both of which the art of chiaroscuro and relief is carried to perfection. Parmigiano, his pupil, left unfinished some frescoes in the Steccata at Parma, in which a figure of Moses breaking the tablets has been greatly extolled. The Zuccheri, Andrea del Sarto, Sebastian del Piombo, Vasari, and nearly every other distinguished painter of the age, practised fresco painting, and sometimes on the most extensive scale; but the art rapidly deteriorated until toward the close of the century, when the Carracci, Domenichino, Guido, and other painters of the eclectic school, restored to it somewhat of its former vitality. Their efforts, however, were but transient, and after the middle of the 17th century, with a few exceptions, no work in fresco of more than moderate merit was executed in Italy. No mention has been made of the great Venetian painters, because they seldom attempted fresco, except on the façades and exteriors of buildings, but developed their genius in oil painting.—The present century has witnessed a revival in fresco painting in various countries of Europe, more particularly in Germany, where, with the exception of a few rude mural decorations in some of the older cathedrals, the art seems never previously to have been practised. The movement was due to the enthusiasm of a knot of young German artists established in Rome at the commencement of the century, whose first works were executed in the house of the consul-general of Prussia, M. Bartholdy, and in the Villa Massimi. In these works Cornelius, Overbeck, Schnorr, Schadow, Koch, and others participated, and Overbeck subsequently painted the "Vision of St. Francis" in the church of the Angeli at Assisi, in the neighborhood of the place where more than 5 centuries before Cimabue and Giotto had executed their first frescoes. Overbeck and a portion of the new school adopted the severe style of the early Italian masters, while others sought to create at once what they considered a national Teutonic school of painting. They were hailed throughout Germany as the regenerators of art, and King Louis of Bavaria invited Cornelius to Munich to decorate the Glyptothek and Pinakothek, as the galleries of sculpture and paintings in that city are called. Under the influence of this master a school of fresco painting sprung up in Munich, numbering among its pupils Kaulbach, Zimmermann, Hess, and many others, whose works cover the walls of the Basilica of St. Bonifacius, the Königsbau, the Festbau, the Allerheiligen-Kapelle, and many other buildings. In the Ludwigskirche is executed Cornelius's largest fresco, the "Last Judgment." In the new museum, the royal palace, and elsewhere in Berlin, are also grand specimens by Cornelius, Kaulbach, Schnorr, and others.—Mural decoration made little progress in France until the present century; but within the last few years many churches in Paris have been embellished by Amaury-Duval, Motez, Brémond, and others. The most celebrated mural painting in Paris, Delaroche's "Hemicycle" in the *palais des beaux arts*, is painted in oil, although it is commonly called a fresco, and has all the breadth and freedom of that method. The erection of the new houses of parliament gave the first decided impulse to fresco painting in England, and in response to an invitation from a select committee of the British parliament the principal artists sent to exhibitions held in Westminster hall in 1843–'45 cartoons and specimens of fresco for the decoration of the build-

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ing. Some of these works, comprising abstract representations of religion, justice, &c., and passages from British history and mythology, have been executed by Cope, Dyce, Ward, Maclise, Herbert, Watts, &c.; others are in progress. A summer pavilion in the gardens of Buckingham palace has been painted in fresco by Leslie, Eastlake, Maclise, Ross, Stanfield, Uwins, and Dyce. Watts is now engaged upon the hall of Lincoln's Inn, and several churches in London have been painted with frescoes in the style of early Christian art. Lastly, in Oxford, Dante Gabriel Rossetti and others of the so called "pre-Raphaelites" have undertaken to adorn the theatre of the Union debating society with a series of paintings on subjects from the romances of King Arthur.

FRESNEL, Augustin Jean, a French physicist, born in Broglie, department of Eure, May 10, 1788, died at Ville d'Avray, near Paris, July 14, 1827. In his childhood he is represented to have had little taste for languages and a very bad memory; but he was nicknamed the man of genius by his brothers, for he devoted his leisure to the determination of the proper calibres and lengths of toy guns, and the proper woods for the fabrication of bows. At the age of 13 he was sent to the central school at Caen, and in his 17th year he entered the polytechnic school, where he gained the applause of Legendre by a peculiar solution of a question in geometry. From the polytechnic school he passed to the school of bridges and roads. After graduating, he was sent into the department of Vendée to superintend the engineering operations of the government, and remained in this service between 8 and 9 years. Upon the landing of Napoleon from Elba in 1815, he joined the Bourbon army of the south as a volunteer, but ill health compelled him to abandon military life, after which he proceeded to Paris. His first memoir, written in 1814, was a demonstration of the phenomenon of the stellar aberration. His first experimental researches were made in 1815 after he began to reside in Paris, and from this time until his death his discoveries and scientific memoirs followed each other rapidly. At the commencement of 1815 he hardly knew what was meant by the term polarization of light, and in less than a year he stood at the head of investigators of the subject. In 1819 he gained a prize offered by the French academy of sciences for an article on diffraction. In 1823 he was elected a member of the academy by a unanimous vote. In 1825 he was made an associate of the royal society of London, and in 1827, just before his death, that society presented him with the Rumford medal. In May, 1824, he was appointed secretary of the commission of lighthouses. He at the same time held the position of engineer of the pavements of Paris; and he was also one of the examiners of the polytechnic school. From the end of 1824 until his death his health was so bad from the effects of unremitting labor that he was obliged to give up all work.—

The true laws of the complicated phenomena of double refraction were demonstrated by Fresnel. It is now known that nearly all crystals possess the property of double refraction. Before Fresnel's investigations it was supposed that Iceland spar and quartz were alone endowed with it. Fresnel in conjunction with Arago explained the interferences of polarized light, giving all the phenomena, and determining all their laws. He proved that all the colors engendered in doubly refracting crystals are particular cases of the interference of polarized light, and also discovered the phenomena which are called circular polarization, and explained their laws. He was an able and enthusiastic advocate of the wave theory of light, against that of emission or material emanations. In 1811 a lighthouse board or commission of lighthouses was formed in France. One of the duties of this commission was to determine whether the system of lighting apparatus then in use might not be improved. In 1819 Arago volunteered to take charge of the experiments on the subject, provided Fresnel and Mathieu were joined with him. The proposition was accepted, and Fresnel devoted the whole strength of his mind to the subject. The result was the system of lens-lighting apparatus which has changed the mode of lighthouse illumination over the whole world, and is universally known as the Fresnel system. The most perfect system of lighting apparatus known before the invention of the Fresnel system was that of parabolic reflectors. In this, for a fixed light, the reflectors are arranged around one or more horizontal circles with their axes parallel to the horizon, and passing (produced) through the centres of the circles. In a revolving light the reflectors are arranged with their axes parallel to each other and to the horizon. By making the system revolve, a bright flash is produced by the combined action of all the reflectors, when the eye is in or near the axis of one of them. As the rays proceeding from a lamp at the focus of a parabolic reflector are parallel to the axis after deviation by the reflector, it is evident that systems arranged as above indicated will show a bright light in the horizon to an observer situated in or near the axis of any one of the reflectors, since the reflected beam does not lose its intensity except by atmospheric absorption. Therefore the greater the number of reflectors, the better will be the light; and to produce as nearly as possible a uniform light at the horizon, the number of reflectors in important fixed lights is sometimes very great, as many as 24 having been used. In all cases the reflectors are made of copper carefully shaped to the form of a paraboloid of revolution, and covered with a uniform coating of pure silver. The objections to the reflector system are: 1, the want of uniformity of the light; 2, the great annual expense, each lamp requiring 50 gallons of sperm oil per year; 3, the rapid deterioration of the reflectors from the necessity of daily cleaning the silvered surface, the silvering requiring en-

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tire renewal at least once in 10 years; 4, the great loss of light caused by the reflection and by the necessary imperfections in form in a parabolic reflecting surface. As soon as he began to study the subject, Fresnel conceived the idea of substituting lenses for the reflectors. A convex lens possesses the property of making all rays proceeding from its principal focus parallel after deviation. It produces the effect by refraction that parabolic reflectors produce by reflection. If therefore a plano-convex lens could be formed which would not much exceed in thickness ordinary plate glass, the loss of light by absorption in passing through such a lens would be much less than it would be in the case of reflection. For the two refracting surfaces the loss does not much exceed $\frac{1}{25}$, while by reflection it is about $\frac{1}{4}$. But if the exterior surface of the lens is spherical, it is evident that, supposing the lens to embrace all rays which are contained in a belt 22½° above and 22½° below the horizon, and in a horizontal angle of 45°, the thickness would become so great for a large principal focal distance that much of the light would be absorbed, and the lens would become useless. The weight, too, would be so great, that it would be nearly impossible to make the apparatus revolve by machinery available at the top of a lighthouse. For these reasons a lens light which existed in England when Fresnel made his experiments was considered a failure. If now a circular central part of the curved surface of a plano-convex lens is moved parallel to itself until at its edges the glass is very thin, the diminution of thickness will not affect the parallelism of the rays after deviation, and the absorption will be very much lessened. If another part of the lens, of a convenient breadth and concentric with the first part, be moved as was the first part until its edges become very thin, the thickness of this will not much increase the absorption, and so of the whole surface of the lens; that is, it can be divided into thin concentric rings of convenient breadth and of nearly the same curvature as the lens, which will absorb but little light, and at the same time will send out the rays parallel to each other, and, if properly adjusted, parallel to the horizon. Buffon first imagined this manner of constructing a lens. Condorcet in 1773 suggested that the rings might be made in separate pieces, and Sir David Brewster made the same suggestion in 1811. Fresnel, without knowing Condorcet's or Brewster's suggestions, conceived the idea of making the lenses in steps and in separate pieces, and, following up his ideas, had the lenses manufactured and applied to lighthouses. To him therefore is the credit of the first application of lenses to lighthouses due, and the system is properly called by his name. The vertical central section of Fresnel's lens, instead of being that of a plano-convex lens, is a figure bounded on the side toward the lamp by a vertical straight line, and on the outside by a serrated line. This last line is a portion of the arc of a circle at its central part, and receding from the centre consists of portions of arcs of circles bounded by horizontal lines. The first lens apparatus made by Fresnel consisted of 8 lenses like that above described, arranged in the form of an octagonal prism. It is evident that an eye situated in the horizon would perceive a bright flash whenever one of these lenses came in front of it, and supposing the octagonal prism to be revolved about its vertical axis, there will be 8 flashes in one revolution. In Fresnel's first apparatus, and in all very large ones manufactured within 10 or 12 years after his invention, the rays in the portion of the sphere above the belt deviated by the lens were brought to the horizon by a combination of lenses and plane reflectors, and those below by the combination of curved glass reflectors similar to the slats of Venetian blinds, except that the reflectors are not precisely parallel, but are placed at such angles that all the light they receive shall be thrown to the horizon. The interval between the flashes is diminished by arranging the auxiliary mirrors so that they will reflect the light a little to one side of the beam refracted by the lenses. This makes the flash longer, and correspondently diminishes the dark interval. In order to produce a fixed lens light which shall show uniformly entirely around the horizon, if the central vertical section of the lens (the section bounded by the serrated line above described) be revolved about the vertical line drawn through the principal focus of the lens, it will generate a solid of revolution, which when made of glass will fulfil the required condition for all rays 22½° above and 22½° below the horizon. Those above and below this zone are brought to the horizon by a combination of lenses and reflectors on the same principle as those described for a revolving lens. But Fresnel was not satisfied with the use of reflectors for bringing to the horizon the rays above and below the central belt of 45°. On account of the acuteness of the angles at which these rays must be incident upon any deviating surface, it was not practicable to bend them to the horizon merely by refraction at two surfaces. He therefore calculated the dimensions of a series of annular prisms, so arranged that the rays from the lamp incident upon the first surface of the prisms were refracted by it toward the horizon, were incident upon the second surface at an angle greater than that of total reflection, were reflected by it, and were so refracted by the third surface that they emerged from the prism horizontal. Thus all the rays proceeding from the lamp, except those obstructed by the glass chimney and the lamp itself, were utilized by the lens, forming the very perfection of a lighthouse apparatus. Fresnel did not live to see his idea of using the prisms instead of reflectors in the large lens apparatus carried out; but small apparatus were made on this principle for harbor lights with entire success. It is believed that the annular prisms were first used in an apparatus of the largest kind in one made at Paris under the direction

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of Alan Stevenson, engineer of the commission of northern lights of Scotland. The prismatic rings placed above and below the annular lens will with the lens throw all the rays to the horizon, and the combination will thus answer admirably for a fixed light. The annular prisms to fulfil their object must be arranged in conical or bee-hive shape above and below the annular lens. For a revolving light, a vertical central section of the annular lens with a meridian section of the system of prisms was revolved around the horizontal line joining the centre of the annular lens and the principal focus of the combination. The revolution was continued far enough to generate a larger or smaller solid as the interval between the flashes was greater or smaller, the dimensions at the top and bottom of the lens regulating the amplitude of the revolution. Thus a polygon of 8 sides answers for an interval of one minute, supposing the time of revolution to be 8 minutes, one of 16 sides to an interval of 30 seconds, and one of 24 sides to an interval of 10 seconds, supposing the time of revolution to be 6 minutes. In order to lengthen the flashes, the upper and lower systems of prisms were moved a little to one side of the central annular lenses. The flash from the prisms was therefore produced a little after that from the lens, but so soon after as to appear a part of it. Another distinction was formed by revolving a system of cylindrical vertical lenses around a fixed apparatus and outside of it. These lenses collected the rays incident upon them, and emitted them parallel to each other and to the horizon. When one of the lenses came opposite the observer, the eye received a bright flash preceded and followed by a short eclipse. Before and after the eclipses the fixed light was visible. This arrangement is called a "fixed light varied by flashes." Nearly the same appearance is given by using the upper and lower prismatic rings of the fixed light and the annular lenses of the revolving light. By revolving the latter, the eye perceives a flash from the annular lens, and in the interval between the flashes perceives the light from the fixed part of the apparatus. It will be seen that the variations which this system admits for the same order are numerous, far surpassing in number those of reflector lights. The latter can only be either fixed or revolving, and it has been found impossible in practice to diversify the intervals between the flashes to any extent. The radii of the spherical surfaces forming the lenses, and the radii and other dimensions of the prismatic rings, are calculated by known formulæ from the index of refraction, the position of the exterior surfaces of the lens with reference to the source of light, and the distances of the various concentric rings and prismatic surfaces from the horizontal plane passed through the principal focus. The surfaces of the lenses are limited in breadth by the condition that the solid of revolution shall not be thick enough to absorb a material portion of the light. This condition makes their breadth about 1.5 inches. Spherical aberration is nearly eliminated by a proper use of the formulæ in calculating the radii of the surfaces. The index of refraction of the glass used is 1.51. In the large lenses the rings are ground in segments of circles, are fastened into brass armatures, and are put together at the lighthouse. The small lenses are placed in their armatures, and are put together ready for erection at the workshops. The glass used is that commonly called flint glass. It is that of St. Gobain, and, although not as colorless as crown glass, was selected because it could be obtained more free from bubbles and striæ than crown glass. It is cast in pieces, exceeding the intended size of the finished parts by about ¼. There are 6 orders of lenses, arranged according to size. The 3 first and largest are used in seacoast lights, and the 3 last in harbor and river lights, and generally in those of lesser importance. They are beautiful exemplifications of science applied to one of the every-day necessities of mankind. Fresnel's invention has also been adapted to small lanterns used for steamers' signal lights, pier head and ferry lights, &c., and many of this kind are now manufactured in the United States of pressed glass. The 1st order fixed lens apparatus is about 6 feet in diameter and 9 feet high. The central zone consists of the central plano-convex belt and 16 steps (*échelons*), arranged in equal numbers above and below it. The lower set of prisms is 6 in number, and the upper set 13. This last set is arranged in the form of a cone, and the whole apparatus is a most beautiful object. In the revolving 1st order lens, having an interval of 10 seconds, there are 17 upper and 8 lower prisms. The 6th and smallest order of lens is 11.8 inches in diameter and 17.5 inches high. The central zone is composed of the plano-convex belt and 4 steps, 2 on each side of it. There are 3 prisms below and 5 above the central zone. As the lamps in use when Fresnel made his invention were entirely incompetent to supply enough light from one burner for the use of the higher orders of lens apparatus, he in conjunction with Arago made a thorough investigation of the subject of lamps. The result was that he adopted for the 1st order lens a burner about 3½ inches in diameter, giving a flame about 4½ inches high, and containing 4 concentric wicks. The intensity of the light of this lamp is about equal to that of 25 ordinary Carcel burners which have a diameter of about ⅞ of an inch. The lamp is placed in the centre of the apparatus. As the heat evolved by such a lamp is very great, there might be danger of melting the burners, and of burning up the wicks. To avoid these difficulties, Fresnel adopted the Carcel lamp, which, by a system of clockwork, pumps up to the burner 4 times as much oil as is consumed. By this means the burners are always kept comparatively cool, and the wicks sometimes burn a whole night without requiring snuffing. For the 2d order lens apparatus a lamp with 3 concentric wicks was adopted; for

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the 3d and 4th orders, lamps with 2 concentric wicks were used, and for the 5th and 6th orders, ordinary Argand burners are used. Very slight changes in any of the details of the lamps have been made since they were first settled by Fresnel. The annual consumption of oil by the lenses of the different orders is as follows: 1st order, 684 gallons; 2d, 461; 3d, 221; 4th, 156 to 190, according as two wicks or one are used; 5th, 70; 6th, 60. In the 1st order octagonal revolving lens the quantity of light sent to the horizon by one of the octagonal faces and its reflectors is between 3,000 and 4,000 times the light of a single Carcel burner, being 8 times as much as that sent to the horizon by the best reflectors that are made. To get the useful effect of the whole lens, the above numbers must be multiplied by 8, that being the number of annular lenses doing the work of that number of burners at the same time. The useful effect of the lens light is to that of the reflector light as 4 to 1; that is, one gallon of oil burned in a lens light throws as much light to the horizon as 4 gallons burned in a reflector light. The brilliancy of a 1st order lens light as compared with the best reflector lights is as 83 to 16, or as 5 to 1.—The first lens apparatus manufactured under the direction of Fresnel was erected in 1823 in the Cordouan lighthouse at the mouth of the Gironde, on the coast of the bay of Biscay. The auxiliary lenses and reflectors for utilizing the rays above and below the central belt have been removed, and are now replaced by the prismatic rings. In 1825 the lens system was adopted for the coasts of France, and as early as 1838, 12 lighthouses on the coast were illuminated by the Fresnel system. In 1845 there were 151 lens lights on the French coast, and it is not probable that there is a single reflector light in France at present. It was next adopted by the Dutch, and in 1834 the authorities of the Scotch lighthouses authorized the erection of a 1st order lens in Inchkeith lighthouse. The Trinity house corporation next adopted the lens system in 1837, and it has since been used by all European maritime nations and their colonies. In 1838 the attention of the United States government was first directed to the Fresnel system. In 1846 a commission consisting of two officers of the navy was sent abroad to examine and report upon the lighthouse establishments of Europe. In 1851 a temporary lighthouse board was authorized by congress, which consisted of 2 officers of the navy, 2 officers of army engineers, 2 civilians of high scientific attainments, and an officer of the navy as secretary. A permanent lighthouse board was established in 1852, and entered upon the performance of its duties in Oct., 1852. Under this board 506 lenses have been erected in the lighthouses of the United States. Of these, 26 are of the 1st, 19 of the 2d, 62 of the 3d, 188 of the 4th, 101 of the 5th, and 110 of the 6th order. Five lenses had been introduced before the creation of the board.—See A. Fresnel, *Mémoire sur un nouveau système d'éclairage des phares* (Paris, 1822); Léonor Fresnel, *Instruction pour le service des phares lenticulaires* (Paris, 1835); Alan Stevenson, "Report to the Commissioners of the Northern Lighthouses on the Illumination of Lighthouses" (Edinburgh, 1834), and "Rudimentary Treatise on Lighthouses" (London, 1850); Senate Document, No. 488, first session 29th congress (Washington, 1846); Senate Document, No. 28, first session 32d congress (Washington, 1852).

FRESNO, an E. co. of California, bordering on Utah, and comprising that portion of the gold-mining region commonly known as the extreme southern mines; pop. in 1856 estimated at 2,400. The precious metal, which is found in the beds of streams and in veins of quartz, is collected chiefly by Chinamen. The eastern and central parts of the county are traversed by the Sierra Nevada; the western part consists mainly of rush-covered marshes called *tulés*. There is good farming land, however, in the neighborhood of King's river, and the pasturage is said to be excellent. Wheat and barley are the principal crops, and the productions in 1858 amounted to 6,000 bushels of wheat, 20,000 of barley, 3,000 of Indian corn, 2,000 of potatoes, and 400 tons of hay. Formed from Mariposa, Merced, and Tulare counties in 1856. Capital, Millerton. An Indian reservation called Fresno and King's river farms, established in 1854, is situated in this county. The farms are about 2,000 acres in extent, 600 of which are under cultivation; and the Indians number 2,555, about 800 of whom are permanent settlers in the reservation, well furnished with agricultural implements, live stock, &c.

FREYBURG, or FRIBOURG, a canton of Switzerland, the 9th in extent; area, 565 sq. m.; pop. in 1850, 99,890, of whom 87,753 were Catholics, the Protestants living almost exclusively in the district of Morat. With the exception of 3 detached portions situated geographically in the canton of Vaud, it is bounded N. and E. by Bern, S. and S. W. by Vaud, and N. W. by the lake of Neufchâtel. On the latter lies also the largest of the detached portions, with the town of Estavayer; the 2 smaller ones, Surpierre and Vuissens, are a little S. The surface of the canton is mountainous, especially in the S., S. W., and E. The principal mountains are the Dent de Brenlieu, 7,836 feet high, the Dent de Folliéran, 7,667 feet, and Mt. Moleson, 6,572 feet. Coal, limestone, limestone slate, and gypsum are found. The principal rivers are the Sarine (Saane), Broye, Sense, and Chandon. One half of the lake of Morat and a considerable part of the lake of Neufchâtel belong to this canton, which has beside several smaller lakes. It has also several mineral springs, all of which are sulphurous. The climate is milder in the N. than in the S. The productions in the basins of the rivers are hemp, flax, maize, and fruit; in the N. W., corn, wine, vegetables, and tobacco. In the higher regions, consisting of meadows, Alps, and forests, cattle rearing and the cultivation of the forests are the chief pur-

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suits. The Gruyère (Greierz) cheese is made here. Horses, sheep, goats, hogs, chamois, roes, hares, lynxes, a few wild boars, and in the N. numbers of wild fowl, are found. The chief articles of export are cheese and timber. There are manufactures of straw hats, leather, tobacco, cotton goods, watches, and silk, but only to a small extent. The common language is a mixture of French and German in several dialects; the German prevails around the capital and in the district of Morat; the official language is French, but all official acts are published in both languages. The new constitutions of March 4, 1848, and May 27, 1857, agree in all essential points with the constitutions of the other cantons. The legislative assembly, the grand council, is chosen for a period of 4 years by a direct vote of all citizens who are over 20 years old; but 10 additional members are elected by the grand council itself. The state council (executive) consists of 7 members chosen by the grand council for a period of 8 years. Freyburg sends 5 members to the national council, and 2 to the federal senate. Its contingent to the federal army amounts to 4,432 men, and its contribution for federal expenses to 39,956 francs. Education in this canton was formerly in a lower state than in many others; but in 1829 there were 229 primary schools, attended by 12,835 children. There is a Protestant college at Morat. Chief towns, Freyburg, Romont, Bulle, and Morat. The canton of Freyburg belonged in the middle ages, as a part of the Uechtland, to Franche Comté. In 1481 the town of Freyburg with its territory joined the Swiss confederacy by the compact of Stanz. The reformation never got a foothold in Freyburg, and it has ever remained one of the strongholds of the Roman Catholic church in Switzerland. During the civil war of 1847, in which the canton joined the *Sonderbund*, it was occupied by Gen. Dufour without much opposition.—Freyburg, or Fribourg, the capital of the above canton, on the Sarine, consists of the lower (German) town in the narrow valley of the river, and the upper (French) town, which rises like a terrace on a succession of sandstone rocks; pop. 9,580. The great glory of the town is the suspension bridge over the Sarine, built in 1832–'4, 905 feet long, 28 feet wide, and 174 feet high. The town has 8 convents and 4 churches, beside several chapels. The principal church, that of St. Nicholas, has a spire 376 feet high, being the highest in Switzerland, and an organ with 7,800 pipes, reckoned one of the finest in Europe. Before the town hall stands the linden tree planted in 1480 in commemoration of the victory at Morat over Charles the Bold in 1476. Before the expulsion of the Jesuits from Switzerland, in 1847, Freyburg had a celebrated Jesuits' college, founded in 1584, restored to the Jesuits in 1818, and counting from 300 to 400 pupils, mostly from Switzerland, France, and Germany. It was reopened as a Catholic college, Oct. 15, 1858, with about 200 pupils. Other objects worthy of notice are the 4 public squares, mint, arsenal, state prison, town library, lyceum with a cantonal museum, observatory, economical society and society of historians, savings bank, theatre, 2 public baths, breweries, manufactories of tobacco, chicory, straw hats, earthenware, iron tools, and woollen yarn, and several dye houses and tanneries. It is the seat of government, and of the bishop of Lausanne and Geneva.

FREYCINET, Louis Claude Desaulses de, a French navigator, born in Montélimart, Aug. 7, 1779, died near Loriol, Aug. 18, 1842. In 1799 he served in the Mediterranean under Admiral Brueys. The next year he accompanied Baudin on his scientific expedition to Australia, and being appointed to edit the nautical and geographical portion of the narrative, devoted 10 years to this task. In 1817 he was intrusted with the command of a new expedition, the object of which was to study the figure of the globe, the elements of terrestrial magnetism, and certain meteorological phenomena in the southern hemisphere. After 3 years' navigation he returned to Havre in 1820, having sailed round the earth, and bringing a great number of observations, charts, and curious specimens for museums. A narrative of this voyage was published (13 vols. 4to., with 4 atlases, Paris, 1824–'44), and gained for Freycinet admission into the academy of sciences.

FREYTAG, Georg Wilhelm Friedrich, professor of oriental languages in the university of Bonn, born in Lüneburg, Sept. 19, 1788. He studied theology and philosophy at Göttingen, and in 1811 became tutor there, which office he renounced in 1815, through hatred of French domination, and was chaplain in the army of the conquerors which entered Paris in 1815. He resigned his office to study the Arabic, Persian, and Turkish languages under Sylvestre de Sacy, and has held the professorship of those languages in the university of Bonn since 1819. Beside Arabic text books, he has published a translation of *Caabi Ben Sohair Carmen in Laudem Muhammedis dictum* (4to., Bonn, 1822), *Proverbia Arabum* (3 vols. 8vo., 1838–'44), *Fakihet al Kholefa*, by Ibn Arabshah (vol. i., Arabic text, Bonn, 1832; vol. ii., translation, 1858), and a large *Lexicon Arabico-Latinum* (4 vols., Halle, 1830–'37), which was followd by an abridgment in 1837.

FREYTAG, Gustav, a German author, born in Kreuzberg, Silesia, July 13, 1816, studied at the universities of Breslau and Berlin, and wrote poetry and plays, some of which were favorably received. A complete edition of them was published in Leipsic, in 3 vols. (1848–'50). Since 1848 he has edited in concert with Julius Schmidt a periodical called *Die Grenzboten*, and in 1854 he was appointed councillor of the court and lecturer of the duke of Gotha. In 1855 appeared his novel *Soll und Haben*, which has gained for him a wide popularity. It was translated into French (1857), into English ("Debit and Credit," 1858), and a 7th edition

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was published in Leipsic in 1858. His drama *Die Fabier* appeared in 1859.

FRIAR (Lat. *frater*, brother), a name applied to the members of certain religious orders who are not cloistered, particularly to the mendicants. The principal orders of friars are the Augustinians or black friars; the Franciscans, gray friars, or friars minors; and the Dominicans, or preaching friars.

FRICTION (Lat. *frico*, to rub), an action arising between the surfaces of two bodies, one of which is caused to move upon or over the other; and also the mechanical resistance to motion consequent on such action. No surfaces can be made absolutely hard or smooth; when one surface is made to slide over another, the slight asperities of the one interlock with those of the other, so that the surfaces must be separated or the points abraded to allow of the motion; but if one surface roll upon another, the prominent points are successively raised, without the need of complete lifting of the body or of wearing off those points. Hence there are two kinds of friction, the sliding and the rolling. The former of these in amount greatly exceeds the latter; it is a leading element in the stability of structures and fabrics of all kinds, and the most important resistance and source of waste in all machinery, and is therefore a chief object of regard in the arts of construction and the science of engineering. To this form of friction attention will here chiefly be given.—Sliding friction increases with the roughness of the surfaces in contact; hence, it is in practice diminished as these surfaces become worn, also by polishing, and by the use of unguents or lubricants, which smooth the rubbing surfaces by filling their depressions. It increases, almost universally, in exact proportion with the entire pressure, owing to weight or other causes, with which the two surfaces are held together; but at very great pressures, somewhat less rapidly. Consequently, in all ordinary cases, so long as the entire weight or pressure remains the same, the friction is, in general, entirely independent of the extent of the surfaces in contact. The exceptions are, some increase when the rubbing surfaces under the same total pressure are very greatly extended, or when either surface is comparatively soft; and considerable lessening of friction when, the bodies being very hard, the rubbing surface is made very small, as in the runners of skates upon ice. For ordinary rates of motion, the total friction within a given space or distance is in like manner entirely independent of the velocity with which one surface is caused to move over the other; but in very slow motions it is increased, and in very rapid motions perceptibly diminished. Friction is also increased in proportion to the tendency of the surfaces to adhere; hence it is usually found greater between bodies of the same kind (steel on steel proving almost an exception) than between those of different kinds; it is usually greater when the surfaces have been long in contact, and at the beginning or motion, and always so, unless corrected by lubricants, between metallic surfaces so highly polished that air may be excluded from between them. The friction of smoothly polished iron on iron has been found not quite $\frac{1}{4}$ the total pressure; of iron on brass, $\frac{1}{4}$; that of an iron axle in a box of brass, lubricated, $\frac{1}{18}$; that of brass on copper, less than on itself. The least possible friction is secured by pivots or edges of polished steel, turning in cups or grooves in the hardest gems. Applications of the above principle are seen in the use of brass boxes for axles of iron and steel, leather between surfaces of iron, &c. The brass bearings or boxes in which the iron shafts of propellers turn, however, having been found to be rapidly worn under the varying pressures due to pitching and rolling of the vessel, boxes of the hardest wood are now substituted; these being kept wet with water or oil, the heat of friction is carried off, and the wear is found to be almost inappreciable. The above principles may be still further generalized. Friction is in effect an equivalent force exerted in a direction opposite to that in which the sliding occurs. Its whole amount is the product of two factors: the first of these, which sums up the effect of the nature and condition of the surfaces, is called the coefficient of friction; the second, which is the sum of all pressures, as weight, strain, and the adhesion due to magnetism (when employed), which act to urge the two bodies together, *i. e.*, perpendicularly to the surface of contact, is called the normal pressure. But this law holds only where, with dry surfaces, the pressure is not enough to indent or abrade either; or, with wet surfaces, not enough to force out the unguent. In either of these cases, the friction increases more rapidly than the ratio of normal pressure. The coefficient of friction (f) is thus the constant ratio of the whole friction (F) to the normal pressure (p); or, $F = p \times f$. The work caused by friction by sliding for a certain distance (s) is $W = p \times f \times s$; and in the case of wooden axles, the number of revolutions per minute (n), and radius (r), the work per second $= 0.1047 \times f \times n \times r \times p$. Extensive tables of the value of f are found in works on practical engineering. The recent results of the elaborate experiments of Morin differ in some particulars from the usually received conclusion as to the relations of like and unlike surfaces. He finds the value of f for wood on wood, dry, .25–.5; do. do., soaped, .2; metals on oak, dry, .5–.6; do. do., wet, .24–.26; do. do., soaped, .2; do. on elm, dry, .2–.25; leather on oak, wet or dry, .27–.35; do. on metals, dry, .56; do. do., wet, .36; do. do., greased, .23; do. do., oiled, .15; metals on metals, dry, .15–.2; do. do., wet, .3; smooth surfaces, with unguents occasionally applied, .07–.08; do., well applied, .05; do., best results, .03–.036. The limit of the normal pressure allowable, with unguents, rapidly diminishes as the speed increases. For lubricants, in case of very slight pressure, as in the

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machinery of watches, the most limpid oils should be used; as the pressure becomes greater, successively, the thicker oils (not including the drying oils), grease, tallow with tar or black lead, black lead alone, or, with very heavy machinery, soapstone. For metal on metal, oils are best, or, if the velocity be such as to burn them, black lead; for wood, the fatty unguents and tar are preferred. The power lost in friction, as is well known, gives rise to heat; this, if moderate, is useful in softening the lubricant; if excessive, prejudicial by decomposing it, softening metal pivots, or firing neighboring combustibles. Constant and copious supply of a good unguent usually averts these effects. Elevation of temperature thus becomes a test of the value of lubricants; a rubbing velocity of 4 to 5 feet per second has been observed to heat good fatty or soapy unguents 40° or 50°, good mineral ones 30°. The obliquity or inclination of the direction of friction to the common perpendicular of the surfaces is known as the angle of repose, and it is the angle of which the coefficient of friction is the tangent. This is the angle formed by either surface, as an inclined plane, with the horizon, at which the other body, the surfaces and pressure being the same, will just begin to slide upon it by the action of gravity. At less angles, friction holds the surfaces in stable contact; and thus it becomes an element of stability in structures, walls, and fences, and of strength in cordage, thread, and woven fabrics. Rolling friction is usually very slight, and diminishes with increase of velocity; in carriages the chief resistance is transferred from the rim of the wheel to the axle, a mechanical gain; and this resistance may be further and almost indefinitely lessened, by the contrivance of an axle rolling upon the rims of smaller, or friction wheels. The resistance of cordage in machinery is due sometimes in part to ordinary friction; always in good part to friction of the fibres and their rigidity, which oppose the bending of the ropes. Applications of friction to useful purposes, beside those already named, are brakes of various kinds, the "locking" of wheels, the "shoe" used in descending declivities, and the so-called adhesion to the rails by the driving wheels of locomotives, enabling them to exert their force upon the train, which Nicklès of Nancy has proposed to increase by electro-magnetism.

FRIDAY, the 6th day of the week, called by the Saxons *Frige daeg*, or day of Frigga (the wife of Odin), whence our name, and by the Romans *dies Veneris*, or Venus's day. (See GOOD FRIDAY.)

FRIEDLAND, a town of E. Prussia, on the Alle, 27 m. S. E. from Königsberg, memorable for a battle gained by the French under Napoleon over the Russians under Benningsen, June 14, 1807, the anniversary of the battle of Marengo. After the combat at Heilsberg the Russian army, numbering about 50,000 men, under Benningsen, concentrated at Friedland. Early on the morning of June 14, Benningsen, learning that Lannes was in the neighborhood with a single division, despatched a column to compel him to retire. Not succeeding at once, he brought out the rest of his troops, and was insensibly led into a general action against the whole French army, which, with Napoleon at its head, had been gradually assembling. By 5½ o'clock the French advanced with great impetuosity and drove the Russian left wing back to the village. A gallant charge of the Russian imperial guard had nearly changed the fortune of the day; but upon being again repulsed they retreated across the Alle, burning the bridges and suburbs behind them. The Russian centre and right, being thus unsupported, gave way after an obstinate contest, and succeeded in fording the river with nearly all their guns, though with terrific loss. The French had between 70,000 and 80,000 men in action, and lost 8,000 men and 2 eagles. The Russians lost 17,000 men and 17 guns. The battle of Friedland led to the peace of Tilsit.—Another town of Friedland in the Bohemian district of Leippa is the capital of the domain of Friedland, which now belongs to the count of Clam-Gallas, and from which Wallenstein derived his title of duke of Friedland; pop. 4,500.

FRIENDLY (or TONGA) ISLANDS, a group in the southern Pacific ocean lying between lat. 18° and 21° 30′ S., long. 174° and 175° 30′ W. The name of Tonga is that by which they are known by the natives. They were discovered by the Dutch navigator Abel Tasman in 1643, and visited and described in 1773 and 1777 by Cook, who gave to them the name of Friendly from the apparently hospitable and kindly reception he met with from the inhabitants. It has since been ascertained, however, that the character of the natives is no better than that of the other Polynesians, and that they were deterred only by fear from attacking Cook, against whom it is now known they plotted treacherously notwithstanding their warm professions of friendship. They consist of about 32 greater and 150 smaller islands, about 30 of which are inhabited; pop. about 25,000. The islands are mostly of coral formation, and are surrounded by dangerous coral reefs. A few, however, are of volcanic origin, and in Tofooa there is an active volcano. They are divided into 3 groups, viz.: the Tonga at the south, the Hapai in the centre, and the Vavao at the north. The climate is healthy, but humid; much rain falls, and none of the islands is destitute of fresh water. The mean temperature during the stay of the U. S. exploring expedition at Tongataboo (April, 1840) was 79.25°. The trade winds are by no means constant. Earthquakes are frequent, but not formidable; hurricanes both frequent and destructive. The natives cultivate yams, sweet potatoes, bananas, cocoanuts, bread fruit, sugar cane, shaddock, limes, and the *ti* (*spondias dulcis*); the pandanus is one of their most useful trees, of which they make their mats; a little corn is grown, and they have the papaw apple (*papaya*) and watermelon. The missionaries

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have successfully introduced the sweet orange from Tahiti, but many other imported fruit and vegetable seeds have failed. The flora resembles that of the Feejee group. Of native quadrupeds they have only the hog, dog, and rat. Tongataboo, or Sacred isle, is the principal island. It is about 18 m. long and 12 broad; it is low and level, of coral formation, and rises nowhere more than 60 feet above the level of the sea. In pagan times it exercised a sort of religious supremacy over the other islands. The only important article of export from the Friendly islands is cocoanut oil. Port Refuge in Vavao is the best harbor, and is much frequented by British and American whalers. The port of Bea on Tongataboo is celebrated as the place where in 1840 Capt. Croker, of H. B. M. sloop Favorite, was defeated by the pagan party. In this engagement, undertaken in behalf of the Christian missionaries and their native partisans, Croker and many of his officers and men were slain. The Friendly islanders contrast favorably with their neighbors, the Feejeeans, in appearance and disposition. The islands were formerly governed by several independent chiefs, but they are now nearly all under the sway of a native Christian prince, called King George. When pagans, the natives were devoted to war; the women went nearly naked. They offered human sacrifices, and cut off their little fingers and toes as preparatory offerings to their gods. Their mythology was, like that of the other Polynesians, a low type of polytheism. The spirits of all chiefs go to Bulotu; those of the poor people remain in this world to feed upon ants and lizards. They represent the island of Bulotu as not far distant, but do not attempt to settle its precise position. Nearly all the population of the islands is now Christian. They were first visited in 1797 by agents of the London missionary society, but in 1827 came under the charge of the Wesleyan society of Great Britain. The group is divided into 3 missionary stations, viz.: Tongataboo and Hapai, commenced in 1829, and Vavao, in 1830. The smaller islands are intrusted to the supervision of native teachers, and are visited occasionally by the missionaries. A printing press has been in operation at Vavao since 1822. Many of the women can sew, and a great number of the natives have learned to read and write, both in their native tongue and in English; a few have been taught arithmetic and geography. King George is a constant preacher, and is thus described by a missionary: "In the pulpit he was dressed in a black coat, and his manner was solemn and earnest. He held in his hand a small bound manuscript book, but seldom looked at it. It was affecting to see this dignified man stretching out his hands over his people, with one of his little fingers cut off as an offering to a heathen god." Of late years some Catholic missionaries have come to these islands from France. Intercourse with the eastern islands of the Feejee group is frequent, and many Tongese have emigrated thither.

FRIENDS, a sect of Christians, commonly called Quakers, which originated in England about the middle of the 17th century. It was founded by George Fox, a native of Drayton, Leicestershire. He was apprenticed to a shoemaker, but at the age of 19, under the conviction of a divine call, he became an itinerant preacher, and went from place to place exhorting those who had the curiosity to hear him to repentance and the commencement of a new life. Mingled with his exhortations there was a general complaint of the coldness and insufficiency of all the religious forms and organizations then in existence, and the assertion that the office of Christian teacher had degenerated from a sacred calling to a secular trade; that nothing but a spiritual unction could fit a man to minister in holy things; and that he in whom this divine call was felt was made a minister by the very fact. The times in which Fox appeared were times of great social and religious agitation in England, the times of Cromwell and the commonwealth. The principles of religious toleration were neither understood nor practised, and George Fox immediately fell under persecution. His life was literally little better than a pilgrimage from prison to prison. But persecution, as usual, made him the object of public attention, and enlisted the sympathies of the people in his cause. His missionary life extended over 40 years, in the course of which he travelled repeatedly all over England and Scotland, beside visiting the continent, and performing a missionary tour among the infant colonies of America. After making multitudes of converts in all directions, he set about the task of organizing them into a church. That organization was original, and grew mainly out of the peculiar doctrines on which the sect was founded. Every Christian community must have its public assemblies; the sect of Friends itself could not have come into existence without them. Who were to preside and speak in these assemblies? There could be no clergy in the old sense of the term; there was no succession to presidency, or teaching by ordination; the power to teach and preside was the immediate gift of God. They came together, and those presided who were made the leaders by personal endowment. Those spoke who were moved to do so by an internal impulse, and those were recognized as teachers who were found by experience to speak to the edification of the assembly. Their church architecture was prescribed and controlled, as was everything else, by their fundamental doctrine of the "inner light" and immediate divine impulse. There was no pulpit in their churches, and there was no one authorized to stand in it if there had been one constructed; there was accordingly, in the place of a pulpit, a long row of benches, slightly elevated above the rest, which was appropriated to the elderly and more venerable members of the society, and especially to those who were oftenest impelled to address their fellow believers. It is easy to see that the ordinances would be omitted from such a church organization as this; he who

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should administer them would immediately become a priest; a sacerdotal order is the inevitable result of the celebration of the rites of Christianity. There could be no such thing either as a liturgy or stated prayers; he who should from Sabbath to Sabbath officiate in this capacity, would to all intents and purposes become a clergyman, and be regarded as such, notwithstanding the doctrines of the divine call and the inner light. But Fox did not stop at the organization of single churches, for the accommodation of single neighborhoods. He instituted monthly, quarterly, and yearly meetings, which should embrace large areas of territory, and thus extend fellowship, sympathy, and coöperation among isolated societies, and keep alive the primitive idea of a church. The business of these meetings was not, as in most ecclesiastical associations, the discussion of theological dogmas, or the comparison of different theological opinions—though there were from the first in the Quaker church, as in all churches, differences of dogmatic belief—but the enforcement of a moral discipline in the discharge of the most essential duties of social life. The followers of George Fox set themselves immediately about some great practical reforms. War, slavery, intemperance, litigation, extravagance, profanity, were made the subjects of the most solemn protest, and participation in them the ground of censure and admonition, and perseverance in them the sufficient cause of expulsion from the community. The strictness of their morality was carried out into what the world considered asceticism. Fashionable dressing, dancing, and the theatre were forbidden, and the luxury of music was set aside as one of the seductive vanities of this life. The whole society was considered as bound to a watchful guardianship over the daily life of each of its members, and if one was seen going astray, his brethren were to admonish, and, if possible, to reclaim him. In the denominational meetings, or, as in other sects they would have been called, ecclesiastical assemblies, the time was taken up with subjects of practical morality; attention was rather turned to the great facts of a religious life than to the diversities of speculative opinion. On the great moral and reformatory enterprises above stated the position of the Quaker church was strong, and its opponents were compelled to admit that the Quaker profession was a guarantee of a morality above the common level of the world. There were other peculiarities, both of principle and practice, of which the Quakers were equally tenacious, which failed to carry the same moral convictions with them, and which operated to their disadvantage. They entertained the opinion that it was morally wrong to comply with the usages of society in their daily salutations and manifestations of mutual respect. They conceived that it had the evil tendency of ministering to human pride to uncover the head, or use the royal style of the plural number in the presence of each other. Accordingly, nothing could induce the Quaker to take off his hat from respect to any human presence. He thought it his duty to use the plain address of "thee" and "thou," instead of using a plural pronoun to designate a single individual. Then the protest against the vanity of fashion in dress led them to continue to use the same style which happened to be in vogue when the sect came into existence. Thus, by a process by no means anticipated, the Quaker dress itself became a fashion, the badge and uniform of a religious sect; and it is impossible to estimate the effect, either for good or for evil, which this fortuitous circumstance has had upon the condition and fortunes of the whole denomination. Another peculiarity which the followers of George Fox introduced was the participation of women in the office of public teaching. But with the principles with which they started, it could not have been otherwise. According to their theory, the real ministry of the Christian community is merely the organ by which "the Spirit speaks to the churches." If it speaks through a woman, there is nothing to be said. Edifying speech is of itself a sufficient authentication of a religious teacher. The discerning of spirits must be of necessity as much a divine gift as the possession of supermundane power. Another peculiarity of the rising sect was of a more serious character, and led to great practical inconvenience, as it touched its relations to the state. If the power to teach and edify the church is a divine gift, and in no measure the result of study and preparation, then it would seem unreasonable that the religious teacher should have any pecuniary support, or at least that such support should be given on compulsion. He may devote himself to some secular pursuit, as other men, for 6 days of the week, and be equally prepared for his sacred function when the seventh day arrives as if he spent his whole time in study and thought. Most especially were the Quakers dissatisfied with the manner in which the clergy were supported in England by the system of tithes. The Episcopal church was a part of the civil constitution, and all the property in the realm was taxable for the support of the clergy of the establishment. The tax was levied on all holders of property, whatever might be their religious opinions. The Quaker made it a matter of conscience to resist the payment of these church dues, and hence he was harrassed by perpetual litigation. He was compelled to take an antagonistic position to the laws of his country; he regarded the law as an oppression, and the magistrate considered him a bad and contumacious subject. There was another Quaker principle which did not commend itself to the moral convictions of the public, the refusal to bear arms, and to be enrolled in the military force of the country.—The first outbreak of Quakerism was powerful; it spread rapidly, and was received in remote regions. It was established extensively in England and America, became one of the recognized sects of Christianity, and was left to its own natural laws of propagation and endur-

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ance. It was found in the lapse of time to be calculated rather for permanency than increase. The quietness of its worship, and even absolute silence of some of its meetings, deprived of the enlivening influence of sacred music, which had formed a part of Christian worship from the beginning, made its assemblies unattractive to the masses, and even to the young of their own community. Another cause which set a limit to the propagation of the Quaker church was the want of a distinct clerical order, to think, write, and speak for them, and by consequence, of an extensive denominational literature. For every theological book produced by the Quakers, other sects have sent forth a hundred. No method was adopted and no pains were taken to preserve the best things of their best minds. No man who has ever attended a yearly meeting of the Friends, can deny that he has heard preaching the most pungent and eloquence of the first order. But it was unwritten, and there was no reporter. The most striking thoughts were spoken into the air, and perished with the utterance. No press multiplied them a thousand fold and scattered them broadcast over the land, or made them part and parcel of the literature of the age. The loss of power from this circumstance alone has been immense. There was another circumstance, proceeding from the same cause, which tended to circumscribe the influence of the denomination. The style of Quaker preaching, uncorrected by the free criticism of the literary world, became peculiar and technical in its phraseology. Although to the initiated it was pregnant, perspicuous, and forcible, full of meaning and edification, to a stranger it was shorn of its power by lying out of the path of common thought and expression. It has always had the merit of being eminently practical. It has never wasted much time in the discussion of doctrines, and nothing can be more simple than the practical precepts of Christianity. It was found, as years rolled on, that the Friends as a sect had strongly developed the element of endurance. In the absence of amusements and the banishment of intoxicating drinks, the most common occasions of youthful aberration were removed. It was found that though for a few years these restrictions might alienate the young from the society, the years of reflection and sobriety would generally bring them back. It was a part of the discipline of the sect to discourage marriages with the outside world, and to confine matrimonial connections to the members of their own denomination. This tended strongly to perpetuate the sect, and to keep their well-saved wealth among themselves. Another cause, however, has operated in another direction. George Fox made his converts chiefly among the rural population. They were spread almost all over England. Their property was in land and real estate, or such personal effects as were obvious to the eye of the tax gatherers, and easily subjected to assessment and distraint. The Quaker, by his principles, was bound to resist the payment of tithes, and he did so to the damage of his worldly estate; vexation and loss were his constant portion. In the lapse of two centuries, this cause has produced a marked and important effect on the followers of Fox. It drove them from the rural districts into the cities, and compelled them to change the investment of their capital, and with it their habits and mode of life. Numbers of them accumulated enormous wealth, with which came influence and social position. They became the associates and rivals of nobles and statesmen; they found themselves in great assemblies sitting at the side of the dignitaries of the church, who had seats in the house of lords and participated in national legislation. This was certainly a great change since the days when a paid priesthood was an abomination, and the churches of the establishment were denounced and derided as steeple houses. Desertions from the profession became numerous, and what was wholly improbable and unanticipated, the deserters went directly into the Episcopal church, and adopted that form of Christianity which before had been the most obnoxious. Great wealth and unquestioned position operated likewise against the discipline of the sect. Of all discipline since the days of the apostles, that of the Friends was originally the most stringent. Delinquents and offenders were made to feel at once and emphatically that they had violated rule and were forfeiting the good opinion of their fellow Christians. Their dwellings were subjected to a domiciliary visitation, and their offences were made a matter of solemn reproof. But he who lived in a splendid palace must be endued with an eminent gift of Christian meekness, to be able to receive such a visit with any becoming degree of humility and submission; and those who administer such an act of discipline must have an assurance quite as extraordinary in order to do it with emphasis and effect. The consequence of this great change of position has been a decline of the ancient discipline, and a relaxation of the watchfulness which the Friends once thought themselves bound to maintain over each other. That neglect of discipline is symptomatic of a diminished interest in their denominational peculiarities, and this too is regarded by many even of themselves as a sign that their mission as a sect in England is nearly accomplished. It is admitted that their numbers do not increase, and that at no time have they exceeded 200,000 in England and America. They have never been solicitous, however, about their census, and no accurate return of their number can be obtained. They estimate their membership in the United States at about 100,000, principally in the states of Pennsylvania (23,000), Indiana (20,000), Ohio (14,000), New York (10,000), Rhode Island (8,000), Maryland (8,000), Virginia (6,000), and North Carolina (3,000).—The great peculiarity of the Quakers, as we have already said, was the doctrine of "the inward light," which "lighteth every man that cometh into the world." This

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doctrine gives a coloring to every other religious opinion. It teaches that God gives to every human being sufficient light, if he will rightly use it, to redeem and save him. Even the heathen are taught directly by God. Those who take heed to the light shining within are progressively illuminated and prepared for heavenly happiness. Those who slight and contemn it, whether pagan or Christian, reject the counsel of God against themselves. This has been regarded by theologians of the liberal school as the basis of a great theological reform, while those of the opposite opinion looked upon it as a fatal departure from "the faith once delivered to the saints," and the introduction of other errors no less dangerous. The previous doctrine had been, that by the fall man had lost all capacity for spiritual good. It was restored only to a few, and those few selected by the divine pleasure. This appearance of partiality on the part of God was removed by the doctrine of universal light, and thus the divine administration was relieved from a supposed reproach, and not only so, but this doctrine laid the foundation of spiritual freedom and emancipation. Accordingly, the largest liberty of thought was enjoyed in the Quaker church from the very first, and the widest differences of opinion were promulgated by speech and writing, without scandal and without offence. As early as 1668, William Penn and George Whitehead held a public discussion with a clergyman of the establishment, in which they maintained that the common doctrine of a tri-personal God was not found in the Scriptures. Afterward, Penn wrote and published an elaborate treatise, which he entitled "The Sandy Foundation Shaken," in which he maintained that the common doctrines of vicarious atonement and justification by imputed righteousness were as destitute of support from the Scriptures as the Trinity itself. He lived ever after in full communion with his brethren, unaccused of heresy. Almost two centuries elapsed before there was any schism in the body on account of doctrinal speculations. About the year 1827 this peaceful sect, without creed or confession as it was, began to be distracted by dogmatic debate. A member named Elias Hicks, a native of the state of New York, began to be disturbed in the exercise of his ministry by a questioning which arose concerning his orthodoxy. He was a man of uncommon depth and strength of mind, as well as force of character, great natural eloquence, and unswerving rectitude of life. While he had embraced the religion of George Fox, he had adopted the theology of William Penn. These views he was capable of setting forth with great power, though they were only occasionally and sparingly introduced. His preaching was mainly of a practical and devotional character. By the mere force of character, talent, and industry, he rose to the first rank in his sect, and his preaching everywhere attracted a crowd. Some of his expressions were doubtless extravagant and unguarded, and led to the suspicion that he was on the borders of total unbelief. Those who had held Quakerism with an orthodox theology became alarmed, imagining that such doctrines tended to the total subversion of the sect. But whatever might have been the alarm of a portion of the hearers of Hicks, his opinions met the convictions of a part, often of a majority of them. His doctrines were canvassed, discussed, and criticized, and everywhere became the prevailing topic of debate. Parties were formed, pamphlets were written, and periodicals were established, advocating one or the other side of the great controversy. Gradually the difference became more and more marked, till at last a schism took place in a small sect of the Christian faith which had lived in peace for almost 200 years. This division did not extend to England, and was regarded by the Friends there with great regret. But the unity of the sect once broken, other divisions have succeeded, extending to England as well as America, so that the harmony of the denomination seems to be broken up.

FRIENDS OF PROGRESS. See Progressive Friends.

FRIES, Elias, a Swedish botanist, born Aug. 15, 1794. He was appointed adjunct professor of botany at Lund in 1819, and professor in 1828. In 1834 he was called to the chair of economy at Upsal, to which in 1851 that of botany was attached, and in 1853 he was made rector of the university. As director of the museum and botanical garden of the university, he introduced important improvements. He has reputation not only as a botanist, but as an orator, and has twice represented the university of Upsal in the diet. His most valuable work is *Summa Vegetabilium Scandinaviæ* (2 vols., Upsal, 1846–'8). He has also published over 100 dissertations and numerous treatises on botany, especially on mycology.

FRIES, Jakob Friedrich, a German philosopher, born in Barby, Prussian Saxony, Aug. 23, 1773, died in Jena, Aug. 10, 1843. He was educated in the school of the Moravian brethren, and studied philosophy at the universities of Leipsic and Jena. He passed several years in Switzerland as a private teacher, after which he became professor of philosophy successively at Heidelberg and Jena. Being deprived of his professorship for having taken part in the democratic movement of 1819, he was in 1824 appointed to the chair of physics and mathematics in the latter university, which he held till his death. His works are numerous, chiefly upon problems of speculative philosophy. Proceeding from Kant, he inclines to the doctrine of faith as developed in the system of Jacobi. He maintains that there is only subjective certainty, that mental phenomena are the only objects of knowledge, but recognizes a principle which he names faith, by which we have a presentiment of the existence of outward things, and of the eternal existence of the ideas of the pure reason. The system of Fries formed the basis of the religious philosophy of De Wette.

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FRIESLAND, or VRIESLAND (anc. *Frisia*), sometimes called West Friesland to distinguish it from East Friesland in Hanover, the most northerly province of Holland, bounded N., W., and S. W. by the North sea and Zuyder-Zee, E. by the provinces of Groningen and Drenthe, and S. E. by that of Overyssel; length 45 m., breadth 40 m.; area, 1,261 sq. m.; pop. in 1858, 270,618. The surface is mostly flat, many parts of it being lower than the level of the sea, from the encroachments of which it is protected by dikes. It is intersected by numerous draining canals, the principal of which is the Great canal, extending from Haarlingen on the W. coast, through Franeker, Leeuwarden, and Dokkum, to Groningen. The whole management of the canals, dikes, &c., is vested in a board called the *Water-Stadt*, and the expense of keeping them in repair is met by a tax levied on the land owners. The only river worth mentioning is the Lauwers. There are many small lakes. Dairy farming is very extensively carried on, 5,000,000 lbs. of butter and 1,000,000 lbs. of cheese being, on an average, annually exported. The chief manufactures are woollen stuffs, linen, sail cloth, salt, paper, starch, spirits, hardware, and tiles. A considerable portion of the people are employed in digging turf for fuel, and fishing. Capital, Leeuwarden.—EAST FRIESLAND, an old principality, now mainly comprised in the Hanoverian district of Aurich. It was part of the territory of the ancient Frisians, and in the 18th century passed to Prussia. Napoleon I. took it from the latter in 1806, but it was restored after the peace of 1814, and a little later was ceded by Prussia to Hanover. (See FRISIAN LANGUAGE AND LITERATURE, and FRISIA.)

FRIEZE, in architecture, the middle, principal member of the entablature, or that part which separates the architrave from the cornice. It has a flat surface, and is often enriched by sculpture in bass-relief. The celebrated frieze of the Parthenon, which was adorned in this way, was a part of the entablature of the second or inner range of columns which surrounded the edifice.

FRIGATE, in naval architecture, originally a name for a class of long vessels common in the Mediterranean, navigated with sails and oars; now applied to ships of war, generally two-deckers, built with special reference to speed. They mount from 20 to 40 guns; sometimes more.

FRIGATE BIRD (called also frigate pelican and man-of-war bird), a tropical web-footed species, belonging to the family *pelecanidæ* (Gray), and to the genus *tachypetes* (Vieillot). The bill is longer than the head, strong, hooked at the end, and sharp; wings long and pointed, the first 2 quills the longest; the tail lengthened, deeply forked, of 12 feathers; the tarsi short and strong, feathered for half their length; toes long, united by a deeply indented web; claws curved, small, and pectinated, the latter character (according to Audubon) enabling the bird to remove insects from parts of the body and head beyond the reach of the bill; at the base of the lower mandible is a small orange-colored sac, capable of distention. The neck is short and stout, and the body slender; the plumage is compact, the eyelids, sac, and front of the upper neck bare. The color of the adult male, in the 4th year, is brownish black, with green and purple reflections; the wings are tinged with gray and brown; the tail dark brown, the shafts white underneath; bill pale purplish blue, white in the middle, and dusky at the tip; iris dark brown; feet reddish above, orange below. In the female the sides of the neck and a broad space on the breast are white, the wings and tail more brown, and the plumage of the back less shining. The length to end of tail is 41 inches, the extent of wings 7 feet or more, and the weight about 3½ lbs. Only 2 species are described by Gray, the *T. aquilus* (Vieill.), very generally distributed in the tropical regions of the globe, and the Australian species, *T. ariel* (Gould). In proportion to their size, their wings are longer than in any other bird; their flight is so powerful that they are seen more than 1,000 miles from land, and so rapid that they descend upon their prey (in the words of Audubon) "with the velocity of a meteor," surpassing even the swiftest falcons; they can glide smoothly along like a kite, and breast the hurricane without apparent effort, rising with ease above the tempest clouds whenever they please; they often fly in flocks so high as to be scarcely visible. They move with great difficulty on land, and rarely alight on the water; by raising the wings perpendicularly and spreading the half-erect tail, they readily ascend from a level surface. They do not dive in search of food, but obtain it on the wing; the smallness of the webs prevents them from being good swimmers. The food consists principally of fish, which their acute sight enables them to detect from a great height; when one sees a shoal of fish, he swoops rapidly down, but does not plunge, quickly changing his course and skimming along the surface with the neck and feet stretched horizontally; then raising the wings above the back, and fixing them one against the other, the bird darts at its prey, which it rarely fails to seize. It follows the shoals of flying fishes, and catches them in the air; it also picks up dead fish and floating garbage like the gulls; during the nesting period young birds form a favorite article of food, its own nestlings suffering in like manner from the turkey buzzards. But its favorite way of providing for its wants, and that which has given it its warlike name, is that pursued by the bald eagle with the fish hawk; possessing great strength, and with superior power of wing, it pursues the terns and gulls which have secured a fish, and by beating them with wings and beak forces them to drop or disgorge it; then descending with great rapidity, it seizes the prey before it reaches the water. It is believed by some that they harass the pelicans and boobies in this manner, but Audubon and others say that this is not the

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case, as these large birds, with a single stroke of their powerful bills, could easily destroy their aggressors. They are very quarrelsome, and the robbers despoil the original thief whenever opportunity offers. With all this strength of wing, Audubon says the keel of the sternum is no more developed than that of the short-flying grouse and partridge, showing the insufficiency of this bony crest as a means of indicating the power of flight. They are not shy; when shot at and wounded they disgorge the contents of the stomach, generally of the most fetid character; their only note is rough and croaking, and very seldom uttered; the flesh is totally unfit for food. They are rarely found further north than Charleston, S. C., but are abundant in the south from Florida to Texas, and in California. These marine vultures, as they have been called, breed in great numbers on the Florida keys, generally making their nests of coarse sticks in mangrove trees, beginning about the middle of May; the eggs are 2 or 3, about 3 inches long and 2 broad, of a greenish white color; the young grow slowly, and are fed by regurgitation.

FRIGGA, the highest and eldest goddess of the ancient Scandinavians, the daughter of Fjörgyn, wife of Odin, and mother of the race of Asen or celestial gods. Her dwelling place is the magnificent mansion of Fensalir (the marshy halls), which denotes the deep, moist earth; and in the representation of the Asen as the children of Odin by Frigga or the earth, the idea is expressed that the supreme Being united himself with the earth to produce the inferior divinities. The favorite servant and intimate confidant of Frigga is Fulla, who is the 5th in rank of the goddesses, and is intrusted with the toilette and most important secrets of her mistress. Gna, the 13th of the goddesses, is Frigga's messenger to the various worlds.

FRINGE TREE (*chionanthus Virginica*, Linn.), a beautiful tree of 10 or 20 feet in height, with somewhat oval, smooth, entire leaves, remarkably 4-cornered pyramidal buds, white, narrow-petalled flowers in drooping racemes, and oval, purple drupes, growing wild at the south. Its light and pure clusters of blossoms are not only suggestive of its English name, but of the generic title of *chionanthus*, blossoms of the snow. It is found in the United States from latitude 39° to the gulf of Mexico, and forms an attractive feature in garden shrubbery.

FRISI, Paolo, an Italian mathematician and philosopher, born in Milan, April 13, 1728, died in the same city, Nov. 22, 1784. He studied with the Barnabites, whose order he entered, and he composed at the age of 22 years a dissertation on the shape and size of the earth, demonstrating more completely than Newton had done its spheroidal figure. He was professor of philosophy successively at Casale, Novara, Milan (1753–'56), and Pisa (1756–'64), and also taught mathematics at Milan. He afterward travelled through France, England, Holland, and Germany, and was received with distinction by the savants of those countries. He was consulted in numerous disputes concerning rivers and torrents, directed a school of architecture at Milan, and was the first to introduce the lightning rod into Italy. The most important of his numerous writings is the *Cosmographia Physica et Mathematica* (Milan, 1774–'75), which has been compared with the *Mécanique céleste* in practical utility to the astronomer.

FRISIAN LANGUAGE AND LITERATURE. The *Freesche Sprêk* is one of the most ancient Teutonic dialects, belonging to the low German group, nearly related to the old Saxon and Anglo-Saxon, as well as to the Icelandic. The rhyming chronicle of Klaas Kolins (1190) shows its transition into the Flemish, out of which the Dutch was developed in the 14th and 15th centuries. Its ancient form exists only in some very remarkable ancient books of law, and its modern vernacular tongues are of 3 kinds, viz.: the N. Frisian (*Strand-Friesisch*), on the W. coast of Schleswig, on its islands, and on Helgoland; the Westphalian varieties of Rustringen, Wursten, E. Friesland, and Saterland (between Ems and Münster); and the Batavian, whose varieties are the common W. Frisian, and those of Mulkweren and of Hindelopen. In this language the demonstratives *thi*, *thjû*, *thet*, answer to the German articles *der*, *die*, *das*. The declension and other accidents of the noun are similar to those in Anglo-Saxon and German. The personal pronouns are: *ik*, I; *thu*, thou; *hi*, *hjû*, *hit*, he, she, it; *wi*, we; *i*, you; *hja*, they. The numerals are: *én*, *twá* (*twéne*), *thrju* (*thre*), *fjûwer*, *fif*, *sex*, *sjúgun*, *achta*, *njúgun*, *tian*; *andlova*, 11; *twilif*, 12; *fiftine*, 15; *twintich*, 20; *thritich*, 30; *hundred*, *thusend*, &c. The following are examples of verbs: *ik brenze*, I bring; *thu brenchst*, thou bringest; *hi brenchi*, he brings; plural, *brenszath*, &c.; imperfect, *brochte*; passive participle, *ebrocht*, brought; *hi heth eweeren*, he has sworn; *is efunden*, is found; *sketh-er enich daddel*, if there happen any death or murder. The derivation and composition are analogous with those in other Germanic tongues. The syntax is less Latinical than that of the Anglo-Saxon; *e. g.*:

Hwer si him sine clathar wet werthat.
Where so him his (Ger. *seine*) cloths wet become.
Thruch thet, thet ma hàch alle thjéva
Though that, that one (Ger. *man*) has all thieves
alsi feste to bindande thet se néne monne nénne
so fast to bind that they no man none
skatha ne due.
injury (scathe) no do.

In this sentence three negatives are used to express a simple negation.—In the literature of the old Frisian we find the most ancient sources of Teutonic jurisprudence, the most important of which are: the *Sendrjucht* (ecclesiastical law), edited by Winshem (Franeker, 1622); *Ost-Fries-Landrecht*, by Wicht (Aurich, 1746); *Hunsinger Landrecht* of 1252 (Groningen, 1778); *Fivelinguer und Oldamster Landrecht*, by Wiarda (1784); *A-sega-buch* (right-say book) of the Rustringians on the Weser, with a German version by Wiarda (Berlin, 1805); *Will-Küren*

(decisions, arbitrations) *der Brokmänner* (a free Frisian people), by the same (1820); *Emsiger Landrecht* of 1312 (Hanover, 1824). Collections of Frisian laws have been made by G. F. van Schwartzenberg (Leeuwarden, 1768). Diplomas and other documents are contained in the histories of Friesland by Schotan and Winshem. See also Montan. Hettema's *Jurisprudentia Frisica* (1834), and "Journey through the Sagelterland" (Saterland), 1836. Among the few specimens of Frisian literature are: the "Wedding of Wantze Gribberts," a comedy (1712); the "Life of Aagtje Ysbrants," a novel; the poems of Alhuysen (Leeuwarden, 1755); Wiarda's history of the language (1784), and of Friesland (1791); and Michelsen's "History of North Friesland" (Schleswig, 1828.)—For Frisian grammar, see the *Friesche Rymlerie*, by Gysbert Japicz (Franeker, 1684). Some scattered and not altogether faultless materials on the subject are found in Jacob Grimm's *Deutsche Grammatik* (Göttingen, 1819). See also B. Bendsen's North Frisian grammar; R. Rask's grammar, translated into German by F. H. Bass (Freiberg, 1834). Among Frisian vocabularies are Wiarda's *Alt-Friesisches Wörterbuch* (Aurich, 1786, inaccurate); Japicz's *Door Epkema, Woordenboek op de Gedichten* (Leeuwarden, 1824); and N. Outzen's *Glossarium der Friesischen Sprache* (Copenhagen, 1837).

FRISII (in the Frankish period also *Frisones* or *Frisiones*), a German tribe, who in the time of Drusus dwelt between the months of the Rhine and the Ems, N. of the district inhabited by the Bracteri, in the modern provinces of Friesland and Groningen. Having lived on friendly terms with the Romans for some time after the first expedition of Drusus, they were soon driven to hostilities by oppression, were partially subdued in 47, and rebelled again with the Batavians under Civilis. In the 5th century a host of Frisii joined the Saxon invaders of Britain. They were afterward subdued by the Franks and converted to Christianity, and Charlemagne defined their rights in 802 by a *Lex Frisionum*. Their country was divided into 3 districts, 2 of which were annexed on the division of the Carlovingian empire to the possessions of Louis the German, and one to those of Charles the Bald. The latter part was called West Frisia (W. Friesland), the two former together East Frisia (E. Friesland). The limits of the modern provinces of the same names, however, do not precisely coincide with those of the time of the division. The distinctive national features of the people were gradually lost by continual contact with their neighbors, and their modern history is chiefly connected with that of the Netherlands and Hanover.

FRITH, or FIRTH (Lat. *fretum*, a strait), properly a narrow passage of the sea, or a deep narrow inlet, particularly on a rocky coast; but in Scotland the name is generally applied to the estuaries of the most important rivers. It is equivalent to the Danish and Norwegian *fjord* and the Icelandic *fiördur*.

FRITH, WILLIAM POWELL, an English artist, born in Harrogate, Yorkshire, in 1820. He is one of the most successful painters of *genre* of the modern English school, selecting his subjects from Shakespeare, Cervantes, Goldsmith, the "Spectator," and kindred sources. Of late years he has produced some striking representations of every-day life.

FRITZ, SAMUEL, a German Roman Catholic missionary, born in Bohemia in 1650, died in Xeberos, Ecuador, in 1730. Being sent as a missionary to the Omagua Indians of South America, he selected as his field of labor the district between the mouths of the Rio Napo and the Rio Negro on the upper Amazon, where in 1688 he had succeeded in attaching 5 other tribes to the Omaguas, among whom he had established 40 missions. The whole number of Indians to whom the gospel was thus preached was about 40,000, forming an active and peaceful population, living in admirable order, distributed into 6 provinces, each of which had its capital. Having in passing through Portuguese territory made geographical observations for the construction of a map, he was arrested by order of the governor of Para, and obtained his liberty only by appeal to the king of Portugal. In 1710 the war of the Spanish succession which was occupying Europe seemed to the Portuguese of Para sufficient reason for making an irruption into the country of the upper Amazon, and of the Indians in the district of Father Fritz more than 20,000 were carried captive to Para, and most of the others fled to their native forests. The missionary bore his complaints to Quito and Lima, but was never able to reëstablish his Indian villages. He made a large map of the river Amazon, which long maintained its authority.

FRIULI (Germ. *Friaul;* anc. *Forum Julii*), an old province of N. Italy, formerly divided between Austria and the republic of Venice, and now forming the circle of Goritz, part of Trieste, and the delegation of Friuli or Udine in Venetia. It was one of the most important duchies of the Longobard kingdom, and after the overthrow of that monarchy by Charlemagne, and even up to the 15th century, when it was conquered by Venice and its territories dismembered, it retained a considerable degree of independence. The modern administrative division is bounded N. by the Tyrol, N. E. and E. by Illyria, S. by the Adriatic and the delegation of Venice, S. W. by Treviso, and W. by Belluno; area, 2,520 sq. m.; pop. in 1850, 429,844. It is watered by numerous rivers and traversed by the railway from Trieste to Venice; its S. part is fruitful in grain and the vine, and the more hilly districts in the N. afford excellent pasturage. There are extensive marshes near the coast, but the climate is generally healthy. More cattle are reared here than in any other part of Austrian Italy. Iron and copper are worked to some extent; there are 6 quarries of good marble, and fine potter's clay is easily manufactured. Captal, Udine.

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FROBEN, or Frobenius, Johann, a Swiss printer, born in Hammelburg, Franconia, in 1460, died in Basel in 1527. He was an intimate friend of Erasmus, whose works he published, and was the first to introduce into Germany the Roman letter in place of the Gothic characters. The emblem of Froben was the caduceus of Mercury surmounted by a dove, and with mottoes in Hebrew, Greek, and Latin.

FROBISHER, Sir Martin, the first Englishman who attempted to discover a N. W. passage to Asia, born near Doncaster, Yorkshire, in what year is not known, died in Plymouth, Nov. 7, 1594. After spending 15 years in fruitless endeavors to get up an expedition, he at length obtained the patronage of Dudley, earl of Warwick, and with 3 barks sailed from Deptford, June 8, 1576, going as far as Labrador and Greenland, discovering the strait now known by his name, and returning in October. Indications of gold were discovered, which led to the despatch of a large squadron in the following year; and the ore brought back being thought valuable, still a third expedition was fitted out with 15 ships in 1578, but the fleet, being scattered by storms on the coast of Greenland, was obliged to return early in the winter without having effected any settlement. In 1585 Frobisher went with Sir Francis Drake to the West Indies; and in 1588, on the defeat of the Spanish armada, was knighted for his services in the action. He afterward commanded a fleet on the Spanish coast, and in 1594 supported Henry IV. against the leaguers and Spaniards, and died of a wound received in an attack on Croyzon.

FROBISHER STRAIT, an arm of the sea in British North America, setting up westward from the Atlantic near the entrance to Davis's strait, between Hudson strait and Northumberland inlet. It separates the regions called Metaincog and Nita, is 240 m. long, 30 m. in average breadth, and has rugged and mountainous shores. It was discovered by Sir Martin Frobisher in 1576.

FROEBEL, Friedrich, a German educator, founder of the *Kindergärten* system of schools for children, born in Oberweissbach in 1782, died in Marienthal, June 21, 1852. In 1826 he published the 1st volume of his work on education (*Die Menschenerziehung*). In this work, as well as in a weekly journal which he edited subsequently (*Wochenschrift für alle Freunde der Menschen Bildung*), he advocated a full and harmonious development of the human faculties. In 1837 he founded a school or *Kindergarten* for little children at Blankenburg, Thuringia, which became the model of similar institutions in many parts of Germany and in foreign countries, especially in Switzerland. His object was to give a wise direction to the mind of the child from its earliest infancy; he regulated the amusements of the children, and rendered them happy at the same time that he endeavored to teach them to think. The duke of Meiningen gave him the use of his mansion of Marienthal, near Liebenstein, for the establishment of a normal school, where female teachers were instructed. His system of education, however, subjected him to many attacks and misrepresentations. The great freedom which he allowed to the children was considered dangerous, and his schools were denounced as nurseries of socialism and atheism. His nephew, Karl Froebel (born in 1808), had founded a school for girls at Hamburg, the programme for which furnished a pretext to the Prussian government for prohibiting (Aug. 7, 1851) all *Kindergärten* in which the Froebel system of education prevailed. Saxony also prohibited them, but they continue to exist in other parts of Germany.—Julius, nephew of the preceding, a German author and traveller, born in Griesheim in 1806. He is the son of a clergyman, and engaged successively at Stuttgart, Munich, and Weimar in various scientific, literary, and statistical labors, the proceeds of which gave him the means of attending the university of Jena and afterward of Berlin. In 1833 he was appointed professor of geography, natural history, and history, at Zürich. Subsequently he officiated in the high school of that city as professor of mineralogy, to which science he has made an important contribution by his *Grundzüge eines Systems der Krystallologie* (Zürich, 1843; 2d ed. 1847). Having become a naturalized citizen of Switzerland in 1826, he took part in politics, in the interest of the extreme radical party, and edited the "Swiss Republican." He also founded a publishing house at Zürich and Winterthur under the name of *Literarisches Comptoir*, and, devoting himself exclusively to this establishment, he relinquished his professorship in 1844, and issued several scientific works and many political pamphlets, which found a large circle of readers. But many of them were suppressed by the government, and having returned to Germany, he was expelled from the Prussian territory and took up his abode in Dresden until the revolution of 1848, when he became a popular leader of the democratic party and a member of the German parliament at Frankfort-on-the-Main. He accompanied Robert Blum to Vienna, was arrested, but acquitted by the same court martial which pronounced the sentence of death upon his unfortunate friend. On the dissolution of the parliament he repaired to Switzerland, and afterward to the United States. He lectured in New York on German politics, engaged in commercial pursuits there, went in 1850 to Nicaragua, and afterward engaged in one or two commercial expeditions to Santa Fé and Chihuahua. In 1855 he edited a journal at San Francisco, and in 1857, after his return to Germany, he was expelled from Frankfort—a proceeding against which the American consul protested upon the ground that he had become a naturalized citizen of the United States. He has since resided in London. Among his works, which include many on geography and politics, are: *System der socialen Politik* (2 vols., Mannheim, 1847); *Die Republikaner*, a historical drama (Leipsic, 1848); and *Aus Amerika, Er-*

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fahrungen, Reisen und Studien (2 vols., Leipsic, 1858). An English translation of the latter work appeared in London in 1859 under the title of "Seven Years' Travel in Central America, Northern Mexico, and the Far West of the United States."

FROG, a well known batrachian reptile of the anourous or tailless order, embracing the group *phaneroglosses* (Dum. and Bib.), with the families *ranidæ* or common frogs, and the *hyladæ* or tree frogs. The general characters of the class and order have been sufficiently given in the article AMPHIBIA, so that the principal families, genera, and species will only be mentioned here. The family of frogs or *ranidæ* includes those genera the free extremities of whose fingers and toes are not dilated into disks, and whose upper jaw is provided with teeth; among these there are many whose thick and clumsy bodies resemble those of toads (*bufonidæ*) rather than of frogs; in addition to maxillary teeth, most have also teeth on the palate and vomer, whose groupings, together with the form of the tongue and the visibility of the tympanum, are characters distinctive of genera and species. Almost all have, in the males, the vocal vesicles in the throat, communicating with the mouth, by the entrance of air into which their remarkable and loud sounds are produced; the nostrils open laterally, near the end of the snout; they have 4 non-palmated fingers, with the rudiment of a thumb, and 5 webbed toes; the back is generally irregularly roughened by glandular and other eminences, while the under surface is smooth. Frogs pass most of their time in the water, being excellent swimmers; the length of their hind limbs enables them to make considerable leaps, and to travel over land in this way long distances in search of water; they are unable to climb trees, like the family *hyladæ* or tree frogs. Some species prefer moist localities and damp woods, where they hide in the grass and under leaves; others dwell in subterranean hollows which they dig on the borders of marshes, coming forth at evening or on rainy days. All the species when adult are decidedly carnivorous, even the smaller eating mollusks, insects, and worms, and all are characterized by great voracity. The frog family is found throughout the globe, though most abundantly in America; indeed 5 of the 8 genera admitted by Duméril and Bibron are peculiar to the new world; after America come Asia, Europe, Africa, and Polynesia, in the order of abundance of species. Of the numerous genera described, the genus *rana* (Linn.), which includes the common frogs, is the best known and the most interesting. The principal characters of the skeleton of the frog are the small number of vertebræ, the absence of true ribs, the development of the transverse processes of the sacrum, the mobility of the iliac bones, the length of the coccyx, the presence of occipital condyles and an arch of scapular bones constituting a shoulder, and the elongation of the bones of the lower extremities. The muscles of the thigh and leg resemble considerably those of man and mammals. When a frog is at rest, the articulations of the pelvis, thigh, leg, and foot form 4 great folds or levers, by the sudden opening of which at the same time its remarkable leaps are effected; the swimming of the frog, which has erroneously been taken as a model for man in this respect, consists in a series of horizontal leaps, the body being sustained by the water, and its general form offering little resistance, and the anterior limbs being folded against the trunk instead of acting as aids to the legs in locomotion; walking of course must be difficult and slow where there is such disparity in the length of the arms and legs. The skin is smooth, made up of the usual layers, and in many parts of the body separated from the muscles to such an extent that it may be considerably distended at the will of the animal; the thin epidermis is frequently renewed; in the pigment layer are seated various colors, especially bright in the season of fecundation. The sense of smell is very imperfect; the tongue is not an organ of taste but of prehension, soft and covered with a viscid mucus, its base attached to the concavity of the lower jaw, its bifurcated point extending backward, and the whole organ capable of being projected from the mouth in a reversed position for the seizure of its insect prey; the organ of hearing has a tympanum, and an aërial cavity under it communicating with the throat. The mouth is very widely cleft, and some of the larger species have been known to swallow small mammals and birds; like other amphibians, they cannot drink. The structure of the heart, gills, and lungs, and the phenomena of the circulation in the tadpole and adults, and of the branchial, pulmonary, and cutaneous respirations, have been described in the article AMPHIBIA. The well known voice of the frog varies so much in intensity and tone as to render it difficult from the sound to ascertain the distance of the animal, far surpassing in this respect the efforts of the most skilful ventriloquist; it can make a dull sound even under water. Among the many authors who have attempted to imitate in words the sounds of the frog, one of the most successful is Aristophanes, in whose comedy of the "Frogs" a frequent verse in the chorus is *brekekekex koax koax*, whose night-long repetition in spring and summer sometimes renders sleep impossible to those unaccustomed to it. By their power of retarding or accelerating the respiratory movements, and of aërating the blood through the vessels distributed to the skin, frogs are able to resist considerable changes of cold and heat, and to sustain life during their winter torpidity; the absorption and exhalation performed through the skin explain their occurrence and prolonged existence under circumstances where ordinary animals would soon perish, as under water and in air-tight places. The sexes are separate, and the reproductive functions are performed in the same mechanical and passionless manner as in

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most fishes; the ova are fecundated at the moment of their exclusion. As the eggs are expelled they are enveloped in a glairy mass, in which the embryos are seen distributed like black dots; the development is very rapid under favorable circumstances of temperature, the head and tail becoming perceptible in the course of the 2d day, the gills on the 3d, and the tadpole at the temperature of 80° F. (as in Rusconi's experiments) may leave the egg on the 4th or 5th day; but in the ordinary seasons of temperate Europe and America, the young are not hatched until about a month after the deposit of the eggs. The tadpole is half an inch long when hatched; the mouth is distinct, but small and without lips; the gills rapidly enlarge, and when at their maximum development afford beautiful objects for displaying the circulation; the gills soon begin to decrease in size, and are finally withdrawn within the branchial cavity, as in fishes, and concealed by an opercular fold of integument; the eyes are perfectly formed; the mouth acquires movable lips, is placed nearer the end of the head, and is used for the introduction of vegetable food; the caudal fin increases in size, and serves for rapid locomotion. Without any great change in form, the size is rapidly increased; 2 small tubercles appear near the vent, the rudiments of the posterior legs, which are soon developed into the perfect limbs; the anterior limbs are afterward formed under the skin in a similar manner; as the legs are perfected the tail is gradually absorbed from the tip to the base, and progression is effected by the hind limbs. The lungs are now fitted for the respiration of air, and the little creatures come on land in search of worms and insects, and in such multitudes in damp weather as to give rise to the belief, still popularly adhered to in many places, that it has rained frogs. They grow rapidly during the summer and autumn, and in winter plunge into the mud to pass their stage of hibernation. In the tadpole state great numbers are devoured by fishes, other reptiles, and by each other; and the adults furnish food for all classes of vertebrata from fishes up to man himself. It is probable that not more than one in a thousand of those which come from the egg in the spring live to reach their winter retreat; if fortunate enough to escape from all enemies, frogs may live many years. Serpents among reptiles, pickerel among fishes, vultures, storks, herons, and cranes among birds, are the worst enemies of frogs; were it not for the storks of Egypt, that country would be overrun with frogs. When it is remembered that each female frog of the hundreds in a single locality may produce 1,000 young, which hide in crevices in the earth and under stones, ready to come forth to enjoy the genial summer showers, there is no necessity for any attempt to explain the appearance of the frog multitudes by supposing them to have fallen from the clouds, as has been believed even from the time of Aristotle, or by the supposition that they have been taken up from some marsh by a whirlwind and let fall during a rain; the latter occurrence, on a small scale, is not impossible, in exceptional cases. The frogs which thus appear bear marks of their recent metamorphosis, in the remnant of a tail and other organs; crawling as they naturally would into the ground, the swelling of the earth from rain would drive them out by compression. From facts recorded in the "Annals and Magazine of Natural History" (1853, pp. 341 and 482), it would seem that frogs and toads may be reproduced without passing through the intermediate stage of tadpole; it is only of late years that many common fishes have been ascertained to be viviparous, and it is not improbable that eggs laid in localities where water cannot be obtained, as in cellars and hot houses and beds, may produce frogs, whose larval form is very soon exchanged for the perfect state, the gills being prematurely cast to enable the animal to accommodate itself to its new circumstances; and it may be, as Mr. Jenyns remarks, that the frogs are hatched on land in the perfect state, the gills either never having existed or having disappeared immediately after birth. On the other hand, it has been ascertained that the larval or tadpole state may be unnaturally prolonged; Prof. J. Wyman (in the "Proceedings of the American Academy of Arts and Sciences," vol. iii. p. 35) experimented on the tadpoles of the common bullfrog, the greater number of which pass the winter without having undergone metamorphosis, not becoming perfect animals until the following spring; he found that the tadpole state, by the influence of darkness and low temperature, could be prolonged certainly from one to two years, and probably much longer; possibly some of the cases referred to by Mr. Jenyns and others may admit of explanation by prolongation rather than an absence of the larval condition, the young frogs having been the result of tadpoles which had passed their larval condition in some other locality, or in the same in a torpid state for a year.—The tenacity of life in frogs is very great; they survive the severest wounds, live a long time after the heart and entrails are removed, and display muscular contractility and the phenomena of circulation in various organs for many minutes and even hours after death has actually taken place. On this account the frog has from time immemorial been selected as a subject of experiment to ascertain and illustrate the most important phenomena of human physiology, and has in this way been of inestimable advantage to mankind. The change of a fish-like animal, breathing by means of gills in water, to a leaping, air-breathing creature, with the corresponding modifications of food and habits, is well calculated to excite the admiration of a thinking person. The air cells of the frog's lungs, the membrane of its foot, and the delicate fringe of the tadpole's gills, afford admirable and easily obtained tissues for demonstrating under the microscope the circulation in the capillary vessels, with their chains of moving blood globules. The structure of the lungs and

the mechanism of their respiration furnished to anatomists and physiologists proof of the changes which the blood undergoes under the influence of the oxygen of the air through the medium of a thin intervening vascular wall. The sensibility of their muscles to the galvanic currents led Galvani and Volta to most important discoveries in electricity and galvanism, whence flowed the great results obtained by Bell, Faraday, and Matteucci in the physiology of the nervous system, and by Davy and others in physics and the chemical constitution of bodies previously supposed simple. The phenomena of cutaneous absorption, exhalation, and respiration have derived their fullest illustration and explanation from experiments made on the soft and naked skin of the frog. Thus this despised creature has rendered the greatest services to anatomy, physiology, physics, and chemistry, and has thrown light which no other animal could on the functions of innervation, muscular contractility, circulation, respiration, absorption, and generation. The frog is not only a graceful and harmless animal, but is actually useful in destroying insects and slugs injurious to vegetation. Though in England and the United States frogs are rarely eaten by man, in France and southern Europe they are largely consumed as food; they are caught in various ways, and are preserved in large "froggeries" until wanted for the table; the flesh is most delicate and nutritious at the time when they are about to enter their winter quarters, yet great numbers are eaten in the spring, when they are more easily caught; the hind limbs are generally the only part eaten, and these are cooked in various modes, in all of which they are as much more delicate than chicken as that is superior to veal and pork. In the materia medica the flesh of frogs has long been used by continental physicians as the basis for anti-scorbutic and restorative broths.—The largest species of the genus *rana* in the United States is the bullfrog (*R. pipiens*, Latr.), which often measures when extended 18 or 21 inches; the general color above is green in front, dusky olive behind, with irregular black blotches, and below yellowish white, with dusky marks; the limbs dusky, with black bars. The bullfrog, so called from its loud voice, is rather solitary in its habits, living about stagnant and sluggish water, not very abundant in one place except during the breeding season; it is the most aquatic of the frogs, and an excellent swimmer, often living for years in wells, where it is allowed to remain under the supposition that it purifies the water; it is also an active leaper, taking to the water when alarmed. Its voracity is extreme; it devours young ducks, snakes, moles, mice, insects, worms, snails, its own tadpoles, and any small animal it can catch; it does not seize prey unless alive or in motion. The species is very generally distributed over the United States. A smaller species, the northern bullfrog (*R. Horiconensis*, Holbr.), is dark olive above, silvery and flesh-colored below; found near the outlet of Lake George. The spring frog (*R. fontinalis*, Le Conte) is green above, with dusky spots behind; throat and abdomen yellow; hind limbs dark green, with dusky bars; a cutaneous fold or ridge from the orbit to the hind legs; the total length is about 8½ inches; it is fond of springs of cold water, and feeds on worms and insects; it is common from Maine to Virginia. The marsh frog (*R. palustris*, Le Conte) is pale brown above, with 2 longitudinal rows of dark brown square spots on the back and sides, yellowish white below, with the posterior half of the thighs bright yellow mottled with black; it is slender and delicately formed, about 8 inches in total length; it is found from Maine to Virginia, on the borders of marshes and pools, and sometimes at a great distance from water; it has a peculiar strong and disagreeable odor; from its being a favorite bait for pike, it is often called the pickerel frog. The shad frog (*R. halecina*, Kalm) is one of the handsomest species, being green above, with ovate spots of dark brown margined with yellow, and yellowish white beneath; it is about 8½ inches in total length, active, and able to leap a distance of 8 to 10 feet when alarmed; it is called shad frog from its appearing in the middle states in the spring with this fish; it is also called water and leopard frog; it is very widely distributed in the United States, and is the nearest representative here of the common frog of Europe, being like that sought after by epicures. The wood frog (*R. sylvatica*, Le Conte) is pale reddish brown above, and yellowish white below; the head has a dark brown stripe extending from the snout to the tympanum through the eye; the total length is a little over 5½ inches; it is found from Michigan to the Carolinas, chiefly in thick woods, preferring those of oak; it is active, when pursued hiding itself under leaves; it rarely approaches water except in the breeding season. The crying frog (*R. clamitans*, Bosc), a slender species, is olive-colored in front, dusky behind, and silvery white below; the total length is 8½ inches; it is very active, and when leaping frightened into the water utters a short loud cry; it is a southern species, taking the place of the spring frog of the north.—Like all other reptiles, the common frog of Europe (*R. temporaria*, Linn.) differs from all American species; the color is generally brown, inclining to reddish or yellowish above, with irregular spots of black or brown, and transverse bands on the legs, and yellowish white below with smaller and fewer spots; the most constant mark is an elongated brown patch behind the eye on each side; the total length is about 7 inches; it is found very generally over Europe. The green frog of Europe (*R. esculenta*, Linn.) is of a general greenish color above, with black or brownish marks, and sometimes with 3 yellow stripes on the back, and yellowish white below; the total length is about 8 inches; it is distributed over Europe, Asia, and northern Africa, and is the species most sought after for food.—There are several species of small frogs,

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principally American and subtropical, belonging to the genus *cystignathus* (Wagler), characterized by the almost entire absence of webs to the toes; for their description the reader is referred to the works of Dr. Holbrook (vol. i.), and of Duméril and Bibron (vol. viii.). The genus *ceratophrys* (Boie) or *phrynoceros* (Tschudi) will be described under HORNED FROG; the tree frogs (*hyla*, Laurenti) and the peeping frogs (*hylodes*, Fitz.) will be noticed under TREE FROG, belonging as they do to the family *hyladæ*.—The frogs are considered by Agassiz lower than the toads among anourous batrachians, on account of their aquatic habits, the persistence of the embryonic webs between the toes, and the non-existence of glands developed in the substance of the skin. The family *ranidæ* are the most numerously represented of the fossil anourous batrachians, and their remains occur in the tertiary and diluvian formations, sometimes of large size. The gigantic *cheirotherium* or *labyrinthodon* is placed by Jäger, Fitzinger, and Owen among batrachians; this immense frog-like animal, with a head 2 or 3 feet long and the body 10 or 12, first appeared in the carboniferous period, was abundant in the triassic, and probably disappeared before the jurassic epoch. This creature, whether saurian or batrachian, is interesting in connection with the fossil footprints of the Connecticut valley. (See FOSSIL FOOTPRINTS.) From facts now ascertained it would appear that the muddy shores and flats of remote geological ages were inhabited by batrachoid forms as strange as the flying *pterodactyle* or the great *ichthyosaurus* and *plesiosaurus*, and that possibly frogs 12 feet long (like *cheirotherium*), and deprived perhaps of anterior extremities, leaped and croaked in the ancient marshes.

FROISSART, JEHAN, or JEAN, a French chronicler and poet, born in Valenciennes in 1337, died in Chimay about 1410. His father, a heraldic painter, destined him from infancy to the clerical profession, although his natural disposition seems not to have fitted him for that calling. He was scarcely 20 years old when, upon the invitation of Robert of Namur, lord of Beaufort, he undertook to write a history of the wars and adventures of his time. He compiled from the *Vraies chroniques* of Jehan Le Bel, canon of St. Lambert in Liége, the 1st part of his own "Chronicles," embracing the period from 1326 to 1340. When this was completed he went to England in 1360 and presented it to Philippa of Hainault, the queen of Edward III., who richly rewarded him. But the queen, discovering that he was the victim of a hopeless passion for a lady of exalted rank in his own country, out of compassion sent him back with a good equipment. In 1362 he returned, and was made clerk of her chapel (having already taken holy orders), and also her secretary. In 1364 he visited Scotland, where he was kindly treated by King David Bruce, and enjoyed the hospitality of the Douglases. He made his journeys on horseback, attended only by his greyhound, and gathering on his way much valuable information, which he used afterward in the continuation of his Chronicles, which henceforth embodied the results of personal observation and experience. After gathering ample materials in Great Britain, he returned to the continent, and in 1366 went to the English court at Bordeaux. Thence he returned for a short time to England, and in 1368 we find him accompanying Lionel, duke of Clarence, to Italy, and, with Chaucer and Petrarch, witnessing in Milan the celebration of the marriage of that prince with the daughter of Galeazzo Visconti. He visited several other Italian courts, and large gratuities were bestowed upon him by some of the Italian princes. In 1369 his protectress Philippa of Hainault died, and he commemorated her virtues in an elegy; he has also feelingly narrated her death in the 2d part of the 1st book of his Chronicles. He now repaired to his native country, where he obtained the living of Lestines. But the life of a country priest did not suit him, and he attached himself to Wenceslas of Luxembourg, duke of Brabant, a liberal, pious, and courteous prince, and himself a poet, who intrusted him with the care of collecting and writing down his rondeaus, ballads, songs, and virelays. To these Froissart added some of his own compositions, and the collection formed a volume with the title of *Melyador*, or the "Knight of the Golden Sun." But Wenceslas died before the work was completed, and Froissart had to look for other employment. Gny, count of Blois, made him clerk of his chapel, and sent him with a letter of introduction and gifts to Gaston Phébus, count of Foix, at whose court Froissart found himself in a congenial sphere. After sojourning a long while at Orthez and receiving from Gaston Phébus on his departure a gratnity of 80 florins, he accompanied this prince's niece, Jeanne de Boulogne, when she went to Riom to marry the duke of Berry. Thence he repaired to Paris, and visited the lord of Coucy in his castle of Crèvecœur, receiving from him much valuable information upon the political relations between France and England. He afterward travelled again through Holland, Languedoc, and other countries. In 1390 he settled at Chimay, having been appointed canon and treasurer to the church there, and, with the exception of the time spent in a visit to England for the purpose of presenting Richard II. with a collection of his poems, he there devoted his later years to the completion of his great work. His book is a living picture of his age. An admirer of heroic deeds, an instinctive courtier of every prince or lord, delighted with feasts and pageants, he vividly depicts all that interests him, and gives more prominence to individual exploits than to important events. He is devoid of patriotism, and shows no partiality to the French, narrating their defeats with as much gusto as their victories; he has no philosophical views nor political opinions; but he is incontrovertibly the most amusing and viva-

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cions of chroniclers. He also left no fewer than 30,000 verses, a few specimens of which have been occasionally published; but his fame rests exclusively upon his historical work. This embraces the annals of the 14th century from 1326 to 1400, and was printed for the first time about 1498 at Paris by Antoine Vérard (4 vols. fol.), under the title of *Chroniques de France, d'Angleterre, d'Écosse, d'Espagne, de Bretagne, de Gascogne, Flandres, et lieux d'alentour.* The last and best edition is by Buchon (15 vols. 8vo., Paris, 1824), reprinted with important additions and improvements in the *Panthéon littéraire*, under the title of *Les chroniques de sire Jean Froissart, qui traitent des merveilleuses entreprises, nobles aventures, et faits d'armes advenus en son temps en France, Angleterre, Bretaigne, Bourgogne, Écosse, Espaigne, Portingal, et ès autres, nouvellement revues et augmentées d'après les manuscrits, avec notes, éclaircissements, tables, et glossaire* (3 large vols. 8vo., Paris, 1835–'6). This, however, is far from being judged satisfactory by the learned, and a competent scholar has been for years preparing a new edition. A volume of extracts, containing the most interesting parts, was published in 1846. His Chronicles were first translated into English by Bourchier, Lord Berners (2 vols. fol., London, 1523–'25), reprinted in 1812 in 2 vols. 4to. Sir Walter Scott was of opinion that for artlessness and vivacity of style, this old version is to be preferred to the more exact and learned translation made by Thomas Johnes, under the title of "Sir John Froissart's Chronicles of England, France, and the adjoining Countries" (4 vols. 4to., Hafod press, 1803–'5). An edition of Johnes's translation has been published by Henry Bohn (2 vols. roy. 8vo., London, 1845).

FRONDE, a political faction in France which headed an insurrectionary movement during the latter part of the minority of Louis XIV. The name of *frondeurs*, which means literally slingers, was applied to its members in derision; in their sneering and flippant attacks upon Cardinal Mazarin they were said to resemble boys throwing stones from slings. The long and powerful rule of Richelieu had completed the work of centralizing all the power of France in the hands of the royal government, and finally broken the might of the independent families in the kingdom. The spirit of opposition, which was crushed in its last conspiracies, revived under his feebler successor in the parliaments or high judicial bodies, of which that of Paris numbered many persons of rank and distinction. Mazarin was hated by the great as a foreigner and friend of foreigners, and by the people for his extortions; he was beside despised, in spite of his successful management of foreign affairs, as an unworthy disciple of Richelieu. The parliament of Paris made use of its privilege to refuse the registration of some new financial acts of the court. It was in vain that several *lits de justice* of the king ordered the registration; the resistance became still more active. Mazarin resorted to violence, causing the arrest of the two most zealous opponents of the court (Aug. 26, 1648). But the next day the people of Paris rose in arms, dispersed the Swiss guards, and erected barricades in the streets adjoining the royal palace. The frightened court repealed the new taxes and promised a better administration of justice. This still more encouraged the *frondeurs* of the parliament, whose continued opposition finally compelled the court to retire to St. Germain (Jan. 6, 1649). Paris was now in the hands of the insurgents, and Prince Louis Condé at the head of 7,000 men undertook to besiege it. The parliament called the people of the city to arms; the prince of Conti, the dukes of Longueville, Beaufort, Orleans, Bouillon, Elbeuf, Vendôme, and Nemours, the marshal de la Mothe, and the genial and popular De Retz, came forward as their leaders; spirited and beautiful ladies, among whom the duchess de Longueville was the most conspicuous, inspired their courage; and foreign aid was expected from the Netherlands. But the leaders of the movement, having it in their power to change it into a complete revolution like that which had just been achieved in England, became afraid of the consequences of their own victory, and hastened to conclude (March 11) a treaty with the court at Ruel. The subsequent phases of the Fronde were composed of intrigues and contentions for power between the princes of the blood and the cardinal-minister. After the return of the court to the capital (Aug. 18), Mazarin again used violence, and had Longueville and the princes of Condé and Conti arrested (Jan. 13, 1650). This caused risings in the provinces, and Marshal Turenne hastened to the rescue of the princes. After several advantages, however, the great general was routed in the engagement of Rethel (Dec. 13). The triumphant minister could not long enjoy his success; the united opposition of all parties compelled him to release the princes, and to fly to the Netherlands. The parliament proclaimed his banishment, and Condé reigned at court. The contest now degenerated into mere intrigue; the queen mother prevailed on Turenne to desert his party; the coadjutor De Retz, the soul of the first movement, was brought over by Mazarin. Condé fled to Guienne, rejected the compromising proposals of the young king, who at the age of 14 had nominally commenced his reign (Sept. 2, 1651), repaired to Bordeaux, armed his numerous adherents, and marched toward the capital; but Turenne commanded against him, and Condé would have been routed near Paris (July 2, 1652) if the gates of the city had not been thrown open to him. Paris, however, tired of commotions, treated with the court, which had withdrawn, and Louis promised an amnesty and the dismissal of the hated minister. Condé, having received a reënforcement of 12,000 men from Lorraine, rejected the propositions, and marched into Champagne; but finding no adherents, he went over to the Spaniards in the Netherlands. Louis XIV. having returned to his capital (Oct. 21), proscribed Condé, and forbade all political

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action on the part of the parliament. Mazarin also returned triumphantly (Feb. 3, 1653) to his post. Many who had distinguished themselves in the parliament or under Condé were temporarily banished, and the movement in the provinces soon subsided (1653).—See De Barante, *Le parlement et la fronde* (Paris, 1859).

FRONTENAC, a county of Canada West, bounded S. by the river St. Lawrence, near its head in Lake Ontario; area, 1,342 sq. m.; pop. in 1852, 30,735. It is traversed by the Grand Trunk railway of Canada, which passes through Kingston, the county seat, and by the Rideau canal, which has a terminus at that city.

FRONTIGNAC, a sweet muscat wine made in Frontignan, in the department of Hérault. It is of two kinds, white and red, and is an agreeable table wine.

FROST. By fall of the temperature of the air to the freezing point, the moisture upon the surface of the earth is congealed, and appears in the form of icy particles, which, as well as the phenomenon itself, are designated as frost. Continuance of low temperature causes the frost to penetrate into the interior of plants, and further and further below the surface of the ground; that is, the moisture is converted into ice, the effect of which, by reason of its increase in bulk, is to burst the fibres of the plant, causing more or less injury, according to the delicacy of its organization, and the quantity of water it may have imbibed. In the soil a similar result takes place when by thawing the earthy particles are freed from the binding effect of the disseminated ice; and when in the spring the frost is said to have come out of the ground, its useful effect is perceived in the finely pulverized state to which it has reduced the clods. This action of the frost extends also to the disintegration of the rocky strata, and it is found to be a most powerful agent in the conversion of the solid materials of the earth to the condition of soil. The water penetrating into the crevices of the rocks and there freezing bursts off the layers, sometimes throwing them violently to a distance with an explosion, as if they had been blasted with powder. The force has even been applied as a mechanical power for splitting rocks, water being poured into the seams and allowed to freeze. What is called white or hoar frost, which is seen in cool mornings covering the ground and objects exposed to the weather, is frozen dew, formed when the air is not so cool as to prevent the dew from being precipitated, but when the surfaces upon which it falls have been reduced by radiation of heat (increased often by rapid evaporation) to so low a temperature as to cause it to congeal. Sometimes the frost does not appear until after the sun has risen, its rays having the effect to reduce the temperature of the surface for a time by increasing the evaporation. (See Evaporation.) A bright morning sun may thus aggravate the injurious effects of frost upon vegetation. To protect plants from frost, it is enough to prevent the radiation of heat from their surface; but this can be done upon a small scale only. A thin covering of any kind of cloth spread over them will serve to check evaporation and the chilling effect it produces. Black frost is the effect produced when plants are frozen by congelation of the moisture within them without the appearance of congealed moisture upon their external surface.

FROST, William Edward, an English painter, born in Wandsworth, Surrey, in Sept. 1810. He commenced his career as a portrait painter, and executed in the course of 14 years upward of 300 pictures of this class. In 1839 he attempted historical composition, and his "Prometheus Bound," exhibited in that year, gained the gold medal at the academy. In 1843 he won a prize of £100 in the Westminster hall competition by his cartoon of "Una alarmed by the Fawns and Satyrs." He thenceforth abandoned portrait painting, and has since confined himself chiefly to classical subjects, or those suggested by the poems of Spenser and Milton.

FROTHINGHAM, Nathaniel Langdon, D.D., an American clergyman and poet, born in Boston, July 23, 1793. He was graduated at Harvard college in 1811, and after teaching in the Boston Latin school and as private tutor, became in 1812 instructor in rhetoric and oratory at Harvard, an office which he was the first to hold. Meantime he pursued the study of theology, and in 1815 was ordained pastor of the First Congregational church in Boston. This charge he retained till ill health compelled his resignation of it in 1850. He is the author of more than 50 sermons, published occasionally, and also of a volume of "Sermons in the Order of a Twelvemonth" (Boston, 1852), none of which had otherwise appeared. He has also contributed many articles to religious periodicals, chiefly to the "Christian Examiner." While a student at Cambridge he delivered a poem at the installation of President Kirkland, and he subsequently contributed several versions from the German and original poems to magazines. In 1855 a collection of these was published in Boston under the title of "Metrical Pieces, Translated and Original," which are distinguished, as well as his prose writings, for refinement of sentiment and graceful expression.

FROTHINGHAM, Richard, jr., an American historian, journalist, and politician, born in Charlestown, Mass., Jan. 31, 1812. At an early age his attention was turned to politics and literature, and he formed a connection with the "Boston Post," of which journal he is yet one of the proprietors, as well as its managing editor, and the chief contributor to its columns. Having become known as a political writer and speaker, he was chosen to the Massachusetts house of representatives in 1839 by his native town, where he has always resided. He was reëlected in 1840, '42, '49, and '50. He was during each of these terms a prominent member of the house, on account of his intimate acquaintance with parliamentary law and general history. In 1850 he was

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nominated for the office of representative in congress by the democrats of the (then) 4th district, but failed of an election. In 1851 he was a delegate to the national convention of the democratic party, and had an effective part in the measures which, in 1852, led to the nomination of Gen. Pierce for the presidency. Mr. Frothingham was elected one of the delegates from Charlestown to the convention called in 1853 to revise the constitution of Massachusetts. He took an active part in the debates of that body, especially on the subject of the judiciary, banking, corporations, the qualifications of voters, the frame of government, the house of representatives, and the militia. For many years he has been a powerful writer on banking, and his opinions with regard to it have been sanctioned by the laws of Massachusetts. In 1851, and in the two following years, he filled the office of mayor of Charlestown, and declined a 4th term. His "History of Charlestown" was published in 1848. In 1849 appeared his "History of the Siege of Boston, and of the Battles of Lexington, Concord, and Bunker Hill," which quickly passed to a second edition. No monograph on the American revolution has greater merit, and it is regarded as of the highest authority both in this country and in Europe. Mr. Frothingham is understood to be now engaged on another historical work. He is a member of the Massachusetts historical society, holding in it the office of treasurer, which he has discharged for several years.

FROUDE, James Anthony, an English historian, a son of the late Archdeacon Froude, born at Dartington rectory, Totness, Devonshire, in 1818. In 1836 he entered Oriel college, Oxford. He took his degree in 1840, and 2 years after obtained the chancellor's prize for an English essay, and was elected fellow of Exeter college. Mr. Froude's sympathy with the high church views which then prevailed led him to entertain the idea of studying for the ministry; and he proceeded so far as to be ordained deacon in 1845. But he never undertook any clerical duty, and soon abandoned theology for literature. In 1847 he published a volume of stories, entitled "The Shadows of the Clouds," and in 1849 "The Nemesis of Faith," a well written but gloomy book, the tendency of which is to throw doubt on the usual theories of revealed religion. Shortly after the appearance of this book, Mr. Froude resigned his fellowship, and was obliged to give up an appointment which he had received to a teachership in Tasmania. For 2 or 3 years he wrote almost constantly for "Fraser's Magazine" and the "Westminster Review." One of his articles in the latter on the book of Job has been reprinted in a separate form. In 1856 the first 2 volumes of his "History of England from the Fall of Wolsey to the Death of Elizabeth" appeared, and in 1858 the 3d and 4th. The materials for this work are mainly derived from the public documents of the time, and the boldness and originality of the author's views have attracted much attention. One of its marked features is an elaborate attempt to vindicate the reputation of Henry VIII.—Richard Hurrell, brother of the preceding, an ardent supporter of the "Oxford movement" in the church of England, in its earlier stages, born March 25, 1803, died Feb. 28, 1833. He was educated at Eton and Oxford, in 1826 was elected to a fellowship in Oriel college, and 3 years after was ordained by the bishop of Oxford. Four volumes of "Remains," made up of extracts from his journals, correspondence, and writings, in which may be seen the simplicity and sincerity of his character, and the Roman tendencies of the Oxford movement even at that early period, were published in London in 1838.

FROZEN OCEAN, a term sometimes used to denote those bodies of water near the polar regions in which vast masses of ice are found floating. (See Antarctic, and Arctic.)

FRUIT, that organ of a plant which contains the seeds. The term is used in reference to every kind of plant which produces seeds or seedlike bodies, which, if not true seeds, answer the same end in reproducing the species. Thus the urn or capsule of a moss, the *apothecium* of a lichen, the *perithecium* of a fungus, the *sporangium* of an alga, the *archegonium* of a fern, are the fruits of these several kinds of plants. The pistil of a flower, which is in the centre of the blossom, itself a modified leaf, folds itself into a hollow chamber called the ovarium, and when this has swelled and grown to maturity, becomes the fruit. Even in the lowest orders of vegetables, there is something answering to the pistil; and the fruit is therefore the ripened pistil. The shape and consistence of the fruit should be dependent on the nature of the pistil; but if it differs, the causes are to be referred to expansion, development, or suppression of some particular portions of it. The term fruit, in common language, and in horticultural books, signifies the matured envelopes of the seeds, such as the apple, pear, peach, nuts, &c.; but in botany, as we have seen, the term is more extensive, and at the same time more natural. The fruit, then, being the ripened pistil, we should expect to see some trace of this upon the fruit; and such is the case, even in those fruits usually called seeds or grains, as the withered silky thread on Indian corn, or the remains of the summit of the pistil on the triangular grains of the sedge grasses, which are also seen in the withered eye of the apple. Some of the most juicy of the pulpy fruits, according to horticultural nomenclature, are merely the calyx monstrously developed, and in the apple, quince, pear, and the like, the hulls containing the seeds are the carpellary ovarium and its cells. The ripened ovarium, thus changed, bears the title of pericarp, and is composed of 3 layers, readily seen in the peach, where the skin is the epicarp, the pulp is the sarcocarp, and the stone is the endocarp. The seed is still within, and forms the kernel of the stone. Even these distinctions do not exist in all fruits which have pericarpal ovaries at first, for they may be all fused into one uni-

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form substance, as in the nut, hardening into a woody shell; for example, the hazel nut and acorn. Fruits are divided into two classes, simple and multiple. The simple are the result of one flower, as the apple, &c.; the multiple are the result of several flowers, as the pine-apple, where each eye or pip bears on its summit some trace of the pistil, and the entire flower spikes have grown together into a fleshy mass.

FRY, Elizabeth, an English philanthropist, born in Bramerton, near Norwich, May 21, 1780, died in Ramsgate, Oct. 12, 1845. She was the daughter of John Gurney, a wealthy merchant and banker of Norwich, and one of her brothers was the author J. J. Gurney. The family belonged to the society of Friends, but did not adhere strictly to the usages of the sect either in dress, language, or social habits. Elizabeth with her 6 sisters dressed and conversed gayly, and took part in many of the social amusements of Norwich, which she even introduced into Earlham hall, her father's country residence. At the age of 17 she visited London in the height of the season, attended theatres and the opera, made acquaintance with Mrs. Inchbald, Amelia Opie, and Dr. Wolcot (Peter Pindar), and took especial delight, as she herself says, in "scandal and grand company." In 1798 an American Quaker, William Savery, who was travelling in England on a religious mission, preached in the Friends' meeting house at Norwich. The assembly consisted of about 200 persons, among whom were the 7 Earlham ladies, and Savery was astonished and pained to find himself in presence of the gayest company of Quakers he had ever seen. As he lamented in his discourse the departure of the ancient plainness and gravity of the sect, Elizabeth was profoundly affected, and subsequent discourses and conversations with the preacher contributed to her change to the strict piety and usages of a "plain Friend." In 1800 she was married to Joseph Fry, whose family belonged to the strict section of the Quakers, and she afterward resided in London, till in 1809 she removed to Plasket house, Essex. In 1810 she became a minister among the Quakers, and in 1813 made her first visit to Newgate prison, where she witnessed nearly 300 women crowded together in rags and filth, without bedding, and suffering all the privations and neglect of the old prison system. Her liveliest sympathies were awakened, and she supplied them with clothing, and did all that was then in her power to ameliorate their condition. After several other visits in 1817, she succeeded in establishing a school and manufactory within the prison, organized a ladies' association for the reformation of the prisoners, and thenceforward devoted all her energies to the promotion of prison reform. Within a few years she personally inspected prisons in many parts of Great Britain, extending the improvements which had already been introduced into Newgate, and instituting committees for visiting female prisoners. Her influence was apparent in most of the gaols, houses of correction, lunatic asylums, and infirmaries of the United Kingdom. No prisoner who had once been under their superintendence was allowed ever to be lost sight of. Those under sentence of transportation were supplied with religious books, and a more favorable treatment of them was obtained from successive ministries. From 1837 to 1842 Mrs. Fry made several journeys in France and in northern and central Europe, visiting prisons, and expounding her plans of improvement to the public authorities. The baron de Gerando was her companion through the hospitals of Paris. The poet Crabbe addressed to her the lines, which appear also in his "Maid's Story":

> Once I beheld a wife, a mother, go
> To gloomy scenes of wretchedness and woe;
> She sought her way through all things vile and base,
> And made a prison a religious place;
> Fighting her way, the way that angels fight,
> With powers of darkness to let in the light.

She was greatly aided in her arduous labors by an exquisitely sweet and soothing voice, which at once subdued the most intractable nature.—See "Memoirs of Elizabeth Fry, with Extracts from her Journals and Letters; edited by Two of her Daughters" (2 vols., London, 1847).

FRY, William Henry, an American composer and journalist, born in Philadelphia, Aug. 1815. His father, William Fry, was proprietor of the "National Gazette" newspaper of Philadelphia. The son was educated in his native city and at Mount St. Mary's college, Emmitsburg, Md. His aptitude for musical acquirements was very early apparent, and his studies in this direction were guided by Mr. Leopold Meignen. His first orchestral productions were 4 overtures performed by the philharmonic society of Philadelphia in 1835, for which the composer received an honorary medal from the society. "The Bridal of Dunure" and "Aurelia," his first two operas, have never been represented, although selections from them have been given in concerts, lectures, &c. In 1839 he became regularly connected with the "National Gazette." In 1844 he was engaged as editor of the Philadelphia "Ledger" when the native American riots raged. He afterward wrote for the Philadelphia "Sun." In 1845 the opera of "Leonora" was written by him for the Seguin troupe, and was produced in June of that year at the Chestnut street theatre. An Italian version was performed in the spring of 1858 at the academy of music in New York. In 1846 Mr. Fry visited Europe, and remained there 6 years, residing chiefly in Paris, and corresponding with the New York "Tribune," the Philadelphia "Ledger," and other newspapers. Mr. Fry returned to America in 1852. In the same year he delivered in New York a series of 10 lectures on the history of music. Two new symphonies, "The Breaking Heart" and "A Day in the Country," were written as illustrations for these lectures by Mr. Fry. These, with two other symphonies, "Santa Claus" and "Childe Harold," were also soon after played by M. Jullien's orchestra in various parts of the

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United States. Mr. Fry's next composition was the music to an ode written for the opening of the great industrial exhibition at New York in 1853. His last published musical work was a *Stabat Mater*, composed in 1855 with full orchestral and vocal score for performance at the New York academy. His most recently performed works are some violin quartettes. Since his return from Europe Mr. Fry has been attached to the staff of the New York "Tribune." He has also become known as a political orator, and as a popular lecturer on miscellaneous subjects.

FUCHS, or FUCHSIUS, LEONHARD, a German botanist and physician, born in Wemding, Swabia, Jan. 17, 1501, died May 10, 1566. He studied at Erfurt and Ingolstadt, adopted the doctrines of Luther, became in 1526 professor of medicine at Ingolstadt, and in 1528 first physician to the margrave of Anspach, and held the chair of medicine at Tübingen from 1535 till his death. He contributed much toward overthrowing the authority of the Arab physicians and to restoring the Greeks to honor. As a botanist he corrected many current errors in the nomenclature of plants. An American plant, the *fuchsia*, bears his name. He wrote a great number of medical and botanical works, of which the most important is a *Historia Stirpium* (fol., Basel, 1542).

FUCHSIA, popularly called EARDROP, a genus of ornamental and very showy plants, belonging to the natural order of *onagraceæ*. The flowers of the fuchsia have the tube of the calyx drawn out and 4-cleft at the apex; within there are 4 petals of a different color, 8 stamens, and a threadlike pistil. The fruit is a 4-valved, 4-celled, many-seeded berry, which is ovate-globose or oblong in shape. The species are low shrubs, having usually opposite leaves, the flowers borne upon single axillary pedicels, though sometimes they are disposed in racemes at the ends of the branches. Perhaps the history of no other greenhouse plant presents so many interesting items as do the changes produced by the hybridizing and rearing of new varieties of this elegant flower. Loudon, in his "Encyclopædia of Plants" (1829), gives only 4 species and a single variety; and in his "Arboretum and Fruticetum" (1844) he gives 21 species. A writer in the "Penny Cyclopædia" (supplement) enumerates 50 species as the number described; and the flower catalogues of the present time (1859) furnish double the number of the choicest varieties only. For many years the only kind known in the United States was the *F. coccinea* from Chili, considered, not more than 20 years ago, one of the most elegant of plants, conspicuous for its axillary and drooping flowers, with scarlet calyx and violet-colored petals. We have lost sight of this older kind in collections. The small-leaved fuchsia (*F. microphylla*) has pubescent branches, with opposite, small, elliptic-oblong, acutish toothed, glabrous, slightly ciliated leaves; the flowers have a scarlet calyx and deep red petals, blossoming from June to September. It was found on the volcanic mountain Jorullo in Mexico by Humboldt and Bonpland, and first known in England in 1828. The corymbose fuchsia (*F. corymbiflora*, Ruiz and Pavon) has somewhat 4-angled branches, opposite, petiolate, oblong-lanceolate, almost entire leaves; the flowers are 2 inches long, scarlet, and hang down in beautiful corymbs; an elegant shrub about 6 feet high, native of Peru about Chincao and Muna. *F. fulgens*, a Mexican species, is somewhat similar, and of magnificent proportions. The tree-like fuchsia (*F. arborescens*) not unfrequently attains a height of 15 feet; its branches are smooth, the leaves disposed in whorls of threes, oval-oblong, acuminated at both ends, petiolate, quite entire; the panicle terminal, trichotomous, nearly naked; the calyx funnel-shaped, with the lobes ovate-acute, spreadingly reflexed, as are also the petals; a native of Mexico. The graceful fuchsia (*F. gracilis*, Lindley) has the branches finely pubescent, leaves opposite, smooth, on long petioles; the flowers with convolute, retuse calyx, lobes of a scarlet color, and the petals purple. There are others, at one time much esteemed, such as *F. conica*, *F. macrostemma*, *F. globosa*, *F. excorticata*, low shrubs fit for bedding out in open ground in the summer; others 6 and 8 feet high, and others still from 12 to 16 feet, such as the apetalous fuchsia (*F. apetala*, Ruiz and Pavon), and *F. arborescens*. It would be difficult, if not impossible, to determine at this time from what sources the present highly reputed varieties have been obtained; yet probably the species we have cited and briefly described, and which were among the first known in Europe, were the parents. A writer in the "Gardener's Magazine" (London) thinks that many, at the time of his communication, may have come from *F. coccinea* and *F. arborescens*, as he found on experiment that certain species mingle freely, and that other species do not. The taller-growing kinds are frequently trained to single stems, and form superb-looking objects for the conservatory. The late Mr. Downing, in his "Letters from England," speaks of "fuchsias grown like standard roses to a wonderful size, with straight stems 16 feet high, and branching into spreading and dependent heads, covered with pendent flowers." He thought the *F. corallina*, among many kinds, was the finest sort for this treatment. Old plants which have flowered can be taken up on approach of frost, and kept through the winter in rather dry sand in any cellar which does not freeze; and when planted out in May in good soil, in some moist shady place, they will prove great ornaments to gardens. The taller kinds, which have been kept in the greenhouse, turned out of their pots into the border, would perhaps do better still; and cuttings put in for blooming plants on the previous summer, making thrifty young stocks, are very elegant when trained for outdoor blossoming. The larger-flowered sorts are considered preferable, though many of the smaller-flowered are exceedingly graceful and unique for pot culture. Some varieties have large white-calyxed

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and scarlet-corolled blooms, and are unsurpassed; others of equal size have rosy calyxes; and by freak, the colors have become reversed, the corolla being white instead of the calyx, which is red or scarlet. As yet such kinds have poor, weak, and insignificant stems, foliage, and habits, and are cultivated more as objects of curiosity than of value. Even approaches to striped flowers are being made; and in fine, such is the propensity to sport in the fuchsia, that almost any kind may in time be anticipated. Indeed the facility with which the different sorts impregnate each other and produce showy flowers from new seedlings, the result of the union, has caused the fuchsia to take rank with the geraniums in floriculture.—The uses of these plants seem to be as yet very limited. The wood of *F. coccinea* is used in Chili to make a black coloring matter; and the leaves and branches are used for some kinds of medicine. The berries of *F. microphylla* are very sweet. Those of *F. excorticata*, a native of New Zealand, are greedily eaten by swine; and so sweet are they when ripe, that attempts have been made to introduce the species into other similar regions as a sugar plant.

FUCUS (Gr. φυκος, a sea weed), a genus of marine plants included with other genera in the common name algæ. Its relations have already been described, and some of the species named, in the article Algæ. Beside living species of fuci, there are others of particular interest from the occurrence of their fossil remains in the most ancient stratified rocks, associated with those of the oldest forms of animal life, also marine, to which they no doubt served as nutriment. They are abundantly met with in the sandstones of the Appalachians, covering the surface of the slabs with irregularly shaped ridges. The flagstones obtained from the Portage group of the New York system so abound with them, that the fossils are seen in every village where these stones are used for the sidewalks. They are particularly noted in the streets of Geneva, N. Y. (See Hall's "Geology of New York," p. 242.) The fossil fuci of the most ancient formations, according to A. Brongniart, are most nearly related to existing species, which belong to tropical climates; but the forms of marine vegetation found fossil in the rocks of the secondary and tertiary formation resemble those now living in temperate climates.—The living species of fuci found about the islands off the southern extremity of South America are so remarkable as to deserve particular notice. They grow up from deeply sunken rocks, and spread over the surface of the ocean, presenting the appearance of extensively inundated meadows. Ships penetrate with difficulty through the obstructions they present. The stems grow very rapidly, and have been known to attain the length of 700 feet; Lamouroux describes them as even exceeding 800 feet. Dr. J. D. Hooker, in the "Botany of the Antarctic Voyage of H. M. Discovery Ships Erebus and Terror, in the Years 1839–'43," gives an interesting account, among others, of the two gigantic species *Lessonia fuscens* and the *macrocystis*. Seen from the surface in sailing over them, they appear like groves of trees, their stems from 8 to 10 inches in diameter, and the branches of the former species spreading out and dividing into sprays, from which the leaves are suspended. Covered with parasitic algæ, and with numerous species of adhering shell-fish, as the chitons and patellæ, and many crustacea and radiata swarming among their tangled roots, while fish of different species are seen darting through their foliage, they remind one of the coral reefs of tropical seas. Their stems strewed upon the beaches appear like drift-wood, and, as they decay, exhale an almost insufferable odor like that of putrid cabbage. The *macrocystis* is a single stem, without branches, vegetating upon rocks in water not exceeding 8 or 10 fathoms in depth; but when swept away from these, it attaches itself to rocks 40 fathoms below the surface, and then elongates itself indefinitely. It is seen upon the beaches rolled up by the waves in great strands larger than a man's body, entangled one with another. The harbors about the Falkland islands, Cape Horn, and Kerguelen Land, are so filled with it that boats can hardly be forced through. The gulf weed is a species of fucus (*F. natans*). It is found floating in the Gulf stream, and in the great tracts of the Atlantic ocean called the Sargasso sea is collected as in the whirl of a vast eddy. It is this sea, presenting boundless fields of floating weeds, that gave alarm to the sailors of Columbus, who feared they might never escape from its entanglements. The fuci are remarkable among vegetables for the large amount of inorganic matter or ash they afford. It is from this ash that the principal supply of the carbonate of soda of commerce, called soda ash, has until recently been obtained. Dr. Thomson states that the gulf weed, which he calls *Sargassum vulgare*, contains 22.58 per cent. of ash; the *padina pavonia*, after drying, 34.75 per cent. They also yield iodide of sodium, and various salts of lime, magnesia, soda, and potash. Along the coast of the British isles, especially on the shores of Ayrshire, the plants are collected in large quantities after storms. They form a valuable manure, and on the west coast of Ireland the poorer classes are almost entirely dependent upon this material for the cultivation of their potatoes. It is carried to Galway from Slyne Head, 50 to 60 m. distant, and is then conveyed sometimes 30 m. into the interior. It is used raw as a top dressing, and the ash for the under crop. The plant also serves as a fuel for the poorer people, and is sometimes cooked for the food called dulse. Long before it was known to contain iodine it was esteemed a purifier of the blood and efficacious in warding off or curing scorbutic or glandular affections. The Icelanders also use different species of the fucus for food. The plants are washed in fresh water, then dried, when they give out a white powdery substance called mannite, sweet and palatable. This is

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collected and packed away in tight casks, and is afterward eaten with milk, fish, or rye flour. Cattle and sheep are said to be very fond of this substance. Carrageen moss and the edible birds' nests are derived from fuci. Bromine and iodine are prepared from its ash or kelp.

FUEGO. See TERRA DEL FUEGO.

FUEL (Fr. *feu*, fire, contracted from Sp. *fuego*, Lat. *focus*, fireplace), the material used for producing heat by combustion. The term is commonly applied only to substances originally derived from the growth of plants, as wood, peat, charcoal, coke, and the various kinds of mineral coal. Even thus limited, it might properly include the inflammable gases, which are used of late for the sake of the heat generated by their combustion. The oils, animal fat, wax, alcohol, &c., are to some extent employed for the same purpose, and might be treated as species of fuel. But in the present article reference will be made only to the materials included in the popular use of the term; and these we propose to treat only in relation to their comparative values as articles of fuel, referring for further details respecting each to its own place in this work.—Some kind of fuel has always been an article of prime necessity to man, at least from the time when he began to prepare his food by the heat of fire, or had learned to prize its comfortable warmth in the cold of winter. His dependence upon it is shown by the substitutes he makes use of in passing through the barren wastes left by nature without fuel or water. The dung of the camel, dried in the sun, is gathered for fuel; and in parts of China and other eastern countries, the dung of cows and horses is collected and mixed into balls, with dust of coal, refuse vegetable matters, and clay; these balls are an article of traffic, and in China are transported upon the canals to distant places. As man gained experience in the properties and uses of the materials around him, the applications of fuel to supply his increased wants were greatly multiplied. By means of it clay was converted into better bricks than those baked in the sun, limestone was burned for cement, and the ores were made to give up the valuable metals they held concealed; and the subsequent treatment of these for obtaining the articles they were fitted to produce was also wholly dependent on the use of fuel. So from the fruits of the field were obtained by various processes, dependent on the combustion of fuel, new products, the continued preparation of which adds not a little to its value. But the modern discovery of its being the most available source of motive power has given to it a new importance hardly inferior to that derived from its other uses, causing it to contribute more than all the other resources of nations to their wealth and prosperity. The questions then of its supply and most economical application are of the highest interest.—Its original source, as already stated, is vegetable growth; but although the provisions of nature are such that the materials that supply this can never fail—inasmuch as the products of the decay or combustion of all vegetable as well as animal bodies are the food of the growing forests, swept through their leaves by the four winds of heaven, which have gathered them up from all quarters—still the annual growth is so widely distributed, that the portion available for the wants of man would not long prove sufficient. The deficiency is amply supplied by the vast stores of fuel laid up from remote ages in beds of mineral coal. Though these are by no means inexhaustible, their extent is proved to be sufficient to justify a reliance upon them for many hundred years to come, when we may safely trust that the need of immense supplies of fuel will no longer be felt by man, or will be furnished from some other source of which we are now ignorant. Wood, the most universally known variety of fuel, presents itself in forms and qualities varying with the tree, and to some extent with the part of this from which it is obtained. It is made up of several compounds—the woody tissue or lignin, the sap, and the alkaline and earthy matters which remain after combustion as its ash. It also contains a variable proportion of water. The first two named are its combustible ingredients, upon which its value as fuel depends; and of these the lignin is of chief importance, often constituting in thoroughly dried wood 95 per cent. or more of its weight. Yet it is not the ingredient which gives to the wood its distinctive character, except so far as this depends on its density, for pure lignin, freed from the matters soluble in water, alcohol, or alkalies, is of uniform composition in all woods and leaves. The sap and the matters it brings with it differ in the different woods; on those of the pine family the sap bestows their resinous properties, on the oak its tannin, &c., and on the beach and birch the peculiar extractive matters which distinguish these. Its composition is not materially different in the proportions of carbon, hydrogen, and oxygen from that of the lignin; but the arrangement of these elements is such as to produce a variety of compounds of different properties. Its proportion is small in the mass of the wood, and is variable in the different seasons. In the spring it flows freely through the vessels, bringing life and vigor to the tree, and this is therefore the season for felling the tree when the object is to secure the principles contained in the sap; but on account of the increased quantity of water present, the wood is not so well adapted for fuel as in its drier condition in the winter. Schübler found that the ash tree felled in January contained of water 28.8 parts, while that cut in April contained 38.6 parts; the sycamore, 33.6 in January, and 40.3 in April; the white fir, 52.7 and 61.0. As the expulsion of the water present involves the consumption of a portion of the carbon of the wood, the more thoroughly this is air-dried or seasoned, the greater is its heat-producing power. As it dries it loses sometimes ¼ of its weight, yet from 20 to 25 per cent. of that which remains is moisture. If this be all expelled by methods carefully contrived to effect this without altering the relations

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of the other constituents, the wood will absorb from the air 10 per cent. or more of moisture. The mean quantity of hygrometric water in 100 parts of various specimens of wood is thus given in the treatise of Richardson and Ronalds; in cord wood the seasoning would not have been so effectual as in the specimens employed:

Six months after felling.	Resinous woods.	Non-resinous woods.
Trunk wood	29	26
Brush wood	33	34
Young branch wood	33	36
In the driest state.		
Trunk wood	15	17
Brush wood	15	20
Young branch wood	15	9

The gravity of wood varies greatly with the different species, and also with its condition as to dryness. Though the solid fibre is heavier than water, the air contained in the cells buoys up the wood, and causes it commonly to float. As the fibre is the heaviest ingredient, a greater weight in dry wood indicates a greater proportion of woody or combustible matter. But even an approximate comparative determination of the quantity of this is attended with much uncertainty. The following table gives the specific gravities of the different kinds of wood named, according to the experiments of the best authorities:

Variety of wood.	Hartig.		Wernek.	Winkler.	Muschenbroek.
	Recently felled.	Dried in air.	Strongly dried.		
Quercus robur (common oak)	1.0754	0.7075	0.6441	0.663	0.929
Quercus pedunculata (pedicle oak)	1.0494	0.6777	....	0.663	....
Salix alba (white willow)	0.9839	0.4873	0.4464	0.457	0.585
Fagus sylvatica (beech)	0.9522	0.5907	0.5422	0.560	0.852
Ulmus campestris (elm)	0.9476	0.5474	0.5768	0.518	0.600
Carpinus betulus (hornbeam)	0 9452	0.7695	....	0.691	....
Pinus larix (larch)	0.9205	0.4735	....	0.441	....
Pinus sylvestris (Scotch fir)	0.9121	0.5502	0.4295	0.4 5	....
Acer pseudo-platanus (sycamore)	0.9036	0.6592	0.5779	0.618	0.755
Fraxinus excelsior (ash)	0.9036	0.6440	0.6187	0.619	0.734
Betula alba (birch)	0.9012	0.6274	0.5699	0.598	....
Sorbus aucuparia (mountain ash)	0.8993	0.6440	....	0.552	....
Pinus abies (fir)	0.8941	0.5550	0.4393	0.493	0.550
Pinus picea (silver fir)	0.8699	0.4716	0.3838	0.434	....
Cratægus torminalis (wild service)	0.8633	0.5910	....	0.549	0.874
Æsculus hippocastanum (horse chestnut)	0.8614	0.5749	....	....	....
Betula alnus (alder)	0.8571	0.5091	....	0.448	0.600
Tilia Europea (lime)	0.8170	0.4390	0.5480	0.431	0.604
Populus nigra (black poplar)	0.7795	0.3656	....	0.346	0.383
Populus tremula (aspen)	0.7654	0.4302	....	0.418	....
Populus Italica (Italian poplar)	0.7634	0.3931	0.4402	....	....

The experiments of Wernek are not considered so accurate as those of Hartig and Winkler. His samples were dried in an oven so long as they continued to lose weight, and the specific gravity was then taken by immersing them in water. Winkler's experiments were upon exact cubic inch samples, uniformly dried for 6 months in a heated chamber and weighed in the air. The recent experiments of Karmarsh, made upon woods in the green state and in the dried state, give the following results:

Variety of wood.	Specific gravity.		Weight.
	Green.	Dried.	
Maple	0.893	0.697	38.15
Apple	1.048	0.768	42.27
Birch	0.919	0.718	39.18
Pear	....	0.689	38.15
Red beech	0.980	0.771	42.27
Box	....	0.971	56.69
Cedar	....	0.568	30.93
Ebony	....	1.259	69.08
Oak	0.978	0.785	43.81
Alder	0.991	0.592	31.96
Ash	0.859	0.692	38.15
Pine	0.920	0.467	25.77
Scotch fir	0.908	....	....
Larch	0.869	0.565	30.93
Lime	0.794	0.581	31.96
Poplar	0.857	0.487	26 80
Quaiac	....	1.302	71.14
Silver fir	0.894	0.622	37.02
Elm	0.009	0.619	34.03
Willow	0.846	0.461	25.77
White beech	1.093	0.759	41.24

The last column of the above table contains the weight in English pounds of one cubic foot of each kind, air-dried, the mean only being given of the two extremes of the original table. The experiments of Marcus Bull upon American woods were conducted with great nicety, the specific gravity of each being taken by coating the dry sample with a varnish of the same weight as water, thus retaining the air in the cells. The following table is contained in his original memoir, read April 7, 1826, and published in the "Transactions of the American Philosophical Society" (vol. iii., new series, pp. 1–60). This gives the weight of a cord of wood as it should be put up, the interstitial matter even then amounting to 44 parts in 100 of the whole bulk; as it often much exceeds this, the measure affords an estimate of the quantity of woody matter, even more uncertain than would be the estimate by weight, variable as this has been shown to be. The arrangement of the columns is as follows: A, specific gravity; B, lbs. avoirdupois in one cord; C, charcoal in 100 parts of dry wood by weight; D, specific gravity of dry coal; E, lbs. of dry coal in one bushel; F, lbs. of dry coal from one cord of dry wood; G, bushels of coal from one cord of dry wood; H, time in hours and minutes during which 10° of heat were maintained in the room by the combustion of 1 lb. of each wood; I, value of specified quantities of each wood compared with shell-bark hickory as the standard.

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Variety of wood.	A.	B.	C.	D.	E.	F.	G.	H.	I.
White ash, *fraxinus Americana*	0·772	3,450	23.74	0.547	28.78	886	31	6 40	77
Apple, *pyrus malus*	0.697	3,115	23.90	0.445	23.41	719	33	6 40	70
White beech, *fagus sylvestris*	0.724	3,236	19.02	0.518	27.26	635	28	6 00	65
Black birch, *betula lenta*	0.697	3,115	19.40	0.428	22.52	604	27	6 00	63
White birch, *B. populifolia*	0.530	2,369	19.00	0.364	19.15	450	24	6 00	48
Butternut, *juglans cathartica*	0.567	2,534	20.79	0.321	13.47	327	42	6 00	51
Red cedar, *juniperus Virginiana*	0.565	2,525	24.72	0.288	12.59	624	50	6 40	56
American chestnut, *castanea esca*	0.522	2,333	25.29	0.379	19.94	560	30	6 40	52
Wild cherry, *cerasus Virginiana*	0.597	2,668	21.70	0.411	21.63	579	27	6 10	55
Dogwood, *cornus florida*	0.815	3,643	21.90	0.550	25.94	762	24	6 10	75
White elm, *ulmus Americana*	0.580	2,592	24.85	0.357	18.79	644	34	6 40	58
Sour gum, *nyssa sylvatica*	0.703	3,143	22.16	0.400	21.05	696	33	6 20	67
Sweet gum, *liquidamber styraciflua*	0.634	2,834	19.69	0.412	21.73	558	26	6 00	57
Shell-bark hickory, *juglans squamosa*	1.000	4,469	26.22	0.625	32.89	1,172	36	6 40	100
Pig-nut hickory, *J. porcina*	0.949	4,241	25.22	0.637	33.52	1,050	32	6 40	95
Red-heart hickory, *J. lacinitata* ?	0.829	3,705	22.90	0.502	26.78	848	32	6 30	81
Witch hazel, *hamamelis Virginica*	0.794	3,505	21.40	0.366	19.56	760	39	6 10	73
American holly, *ilex opaca*	0.692	2,691	22.77	0.374	19.68	613	31	6 20	57
American hornbeam, *carpinus Americana*	0.720	3,218	19.00	0.455	23.94	611	25	6 00	65
Mountain laurel, *kalmia latifolia*	0.663	2,963	24.02	0.457	24.05	712	30	6 40	66
Hard maple, *acer saccharinum*	0.644	2,878	21.43	0.431	22.68	617	27	6 10	60
Soft maple, *A. rubrum*	0.597	2,668	20.64	0.370	19.47	551	28	6 00	54
Large magnolia, *magnolia grandiflora*	0.605	2,704	21.59	0.406	21.36	584	27	6 10	56
Chestnut white oak, *quercus prinus palustris*	0.885	3,956	22.76	0.481	25.31	900	36	6 30	86
White oak, *Q. alba*	0.855	3,821	21.62	0.401	21.10	826	39	6 20	81
Shell-bark white oak, *Q. obtusiloba* ?	0.775	3,464	21.50	0.487	22.99	745	32	6 20	74
Barren scrub oak, *Q. Catesbæi*	0.747	3,339	23.17	0.399	20.68	774	34	6 30	73
Pin oak, *Q. palustris*	0.747	3,339	22.22	0.436	22.94	742	32	6 20	71
Scrub black oak, *Q. Banisteri*	0.728	3,254	23.50	0.387	20.24	774	34	6 20	71
Red oak, *Q. rubra*	0.728	3,254	22.43	0.400	21.65	680	30	6 20	69
Barren oak, *Q. ferruginea*	0.694	3,102	22.37	0.447	23.52	694	29	6 20	66
Rock chestnut oak, *Q. prinus monticola*	0.678	3,030	20.86	0.456	22.94	672	28	6 00	61
Yellow oak, *Q. prinus acuminata*	0.650	2,919	21.60	0.395	13.52	691	41	6 10	60
Spanish oak, *Q. falcata*	0.548	2,449	22.95	0.363	19.05	562	30	6 20	52
Persimmon, *diospyros Virginiana*	0.711	3,178	23.44	0.469	24.63	745	30	6 30	69
Yellow pine, soft, *pinus mitis*	0.551	2,463	23.75	0.333	17.58	585	33	6 30	54
Jersey pine, *P. inops*	0.478	2,137	24.88	0.302	20.26	533	36	6 40	48
Pitch pine, *P. rigida*	0.426	1,904	26.76	0.298	15.68	510	33	6 40	43
White pine, *P. strobus*	0.418	1,868	24.85	0.293	15.42	455	30	6 40	42
Yellow poplar, *lyriodendron tulipifera*	0.563	2,516	21.81	0.383	20.15	549	27	6 10	59
Lombardy poplar, *populus dilatata*	0.357	1,774	25.00	0.245	12.89	444	34	6 40	40
Sassafras, *laurus sassafras*	0.618	2,762	22.58	0.427	22.47	624	28	6 20	59
Wild service, *crataegus terminalis*	0.887	3,964	22.62	0.594	31.26	897	29	6 20	84
Sycamore, *acer pseudo-platanus*	0.535	2,391	22.60	0.374	19.68	544	29	6 30	52
Black walnut, *juglans*	0.681	3,044	22.56	0.418	22.00	687	31	6 20	65
Swamp whortleberry, *vaccinium corymbosum*	0.752	3,361	23.80	0.505	26.57	788	29	6 30	73

The lignin of wood was first shown by Prout to be of the same composition in the different species of trees, by analyzing portions from the box and the willow, after they were freed from all soluble matters and thoroughly dried in the air. The box gave 50 per cent. each of carbon and of the elements of water, and the willow 49.8 of carbon and 50.2 of hydrogen and oxygen. Its composition is therefore thus expressed: $C_{36}\ H_{44}\ O_{24}$. Liebig, however, from the analyses of Gay-Lussac and Thénard, which were of oak (carbon 52.53, water 47.47) and of beech (carbon 51.45, water 48.55), gives the formula $C_{36}\ H_{22}\ O_{22}$. As the gaseous elements uniting in the combustion to produce water have but a feeble agency in developing heat, the caloric disengaged must be due to the union of the carbon with the oxygen of the air. To convert 52 parts of carbon into carbonic acid, there are required 138 parts of oxygen, and the heat developed in this reaction is sufficient to raise 3,666 parts of water from 32° to 212°. This accords with the practical results obtained by Rumford and Hassenfratz, giving 3,600 to 3,680 as the equivalent for dry woods. The composition of the sap is so nearly the same as that of the woody fibre, and its quantity is so small, that its presence modifies the result only in a very slight degree. The mineral constituents of some parts of the tree may have more influence, as in the bark of some trees they amount to 3 per cent., and in the leaves to 7. In the ultimate analysis of the wood there is also found about 1 per cent. of nitrogen. The analyses of M. Violette of different parts of a cherry tree, prepared with special precautions, exhibit in the following table these peculiarities of composition:

ELEMENTARY SUBSTANCES FOUND IN 100 PARTS OF WOOD.

Nature of wood.		Carbon.	Hydrogen.	Oxygen and nitrogen.	Ash.
Leaves		45.015	6.971	40.910	7.118
Small branch	Bark	52.496	7.312	36.737	3.454
	Wood	48.359	6.645	44.730	0.504
Middle sized do.	Bark	48.855	6.342	41.121	3.682
	Wood	49.902	6.607	43.356	0.134
Large branch	Bark	46.871	5.570	44.674	2.886
	Wood	48.003	6.472	45.170	0.354
Trunk	Bark	46.267	5.980	44.755	2.657
	Wood	48.925	6.460	44.319	0.296
Large roots	Bark	49.985	6.094	42.761	1.159
	Wood	49.324	6.296	44.108	0.231
Middle sized do.	Bark	50.567	6.049	41.920	1.643
	Wood	47.390	6.250	46.12	0.228
Rootlets, with branch		45.068	5.656	43.245	2.007

When wood is exposed to the action of heat, its more volatile ingredients, as the hygrometric moisture, first escape; its gaseous elements are next disturbed from their state of equilibrium, and the hydrogen and oxygen when set free from one combination enter into new ones; portions of these gases combine to produce water; other portions seize upon the carbon and form with this a multitude of unstable compounds,

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varying with the degree of temperature and the proportions of the elements present. If the process be conducted in close vessels away from the action of air or oxygen, the volatile ingredients may be driven off in the form of inflammable gases, and of vapors of water holding in solution numerous combustible principles, and last of all the vapors of the resins and ethereal oils constituting tar. Oxygen is required to complete their combustion and bring the elements of the fuel to their goal of carbonic acid (CO_2) and water (HO). In this process but a small portion of the carbon has been taken up and made volatile by uniting with the hydrogen and oxygen. This fixed ingredient is left behind in the form of charcoal, retaining the form of the wood. So when wood is consumed in the air, heat is first applied to drive out the volatile elements. The hydrogen eliminated in the pores of the fuel at a heat below that of redness takes hold of a portion of the solid carbon, and meeting the air they rapidly enter into combination with its oxygen, emitting light and heat. By the latter new supplies of the volatile ingredients are disturbed further within the mass of the burning body, and there by their ignition serve to keep up the process. There being no lack of oxygen, the combustion is complete, and the volatile products of the distillation process, if generated at all, pass immediately into the stable compounds of carbonic acid and water. The carbon attacked at its surface by the oxygen of the air yields more slowly, and the principal portion of it is left behind after the flame and rapid chemical action caused by the combustion of its volatile associates have disappeared with their departure. The combustion of this charcoal, going on only in the space it occupies, produces an intensity of calorific effect far superior to that derived from the burning of the gaseous elements. Hence, where concentration of heat is required, as in the smelting of ores, a condensed form of fuel like charcoal is more effective than one containing gaseous elements, which in their combustion dispense a very uncertain amount of heat, as they flit, perhaps but partially consumed, past the points where the effect is wanted, carrying with them a portion of the carbon of the fuel, and also more caloric rendered latent than the product of combustion of an equal weight of carbon is capable of absorbing. This will be again alluded to in this article in treating of the heating power of fuels. The difference in the pyrometrical effect of wood and charcoal would be still greater than it is, were it not for the property of charcoal of rapidly absorbing moisture from the air. When it is desirable to apply the heat generated by combustion at a distance from the fire, as in reverberatory furnaces, fuel is preferred that burns with a flame. So where the gaseous products are the object, to be used for purposes of illumination or otherwise, the fuel most abounding in hydrogen is sought for, and this may be the lighter kinds of wood, the resinous and oily products distilled off from its fixed carbon, or the highly bituminous coals. The natural fuels thus give rise to a variety of artificial products better applicable for special purposes.—As charcoal is obtained from wood by charring, so from peat this fuel is obtained in a condensed form called peat charcoal, and from the bituminous coals the mineral charcoal or coke. The mode of occurrence of peat has already been treated in the article Bog. This fuel, found in great abundance and easily procured in many of the European countries, where other fuels are scarce, is there much more highly appreciated than it is in the United States. Its qualities have there been thoroughly investigated, and various methods have been contrived for improving its adaptation to the uses for which it is fitted. (See PEAT.) As a fuel, this material is much used for domestic purposes in the countries where it abounds, and it is applied both in the raw state and charred to manufacturing operations. In the neighborhood of Carolinen-Hütte, near Aichthal, in Styria, successful attempts have been made to smelt iron with it in its raw state, mixed with wood; while the charcoal obtained by charring it has long been successfully applied to the same purpose in Bohemia, Bavaria, France, Russia, and other countries. For generating heat this charcoal is stated by Dr. Muspratt to be, when of good quality, "as efficient as bituminous coal, and some varieties are even above the average heating power of the latter kinds of fuel." When freshly cut, peat contains from 80 to 90 per cent. of water, which by drying is commonly reduced to about 25 per cent. When well dried, the heating power of good peat is about the same as that of wood, and about half that of bituminous coal. The following analyses by Sir Robert Kane and Dr. W. K. Sullivan, editor of the Dublin "Journal of Industrial Progress," are of peat dried at 220° F. The proportions are calculated after deducting the ash. The percentage of the mineral ingredients varies in good peat from 1 to 5; some qualities contain much more, even 33 per cent., but such are worthless for fuel.

Varieties.	Carbon.	Hydrogen.	Oxygen.	Nitrogen, mean.
Surface peat, Phillipstown	58.694	6.971	32.883	1.4514
Dense peat, "	50.476	6.097	32.546	0.8806
Light surface peat, wood of Allen	59.920	6.614	32.207	1.2588
Dense peat, wood of Allen	61.022	5.771	32.400	0.8070
Surface peat, Twicknevin	60.102	6.723	31.288	1.8866
Light surface peat, Shannon	60.018	5.875	33.152	0.9345
Dense peat, "	61.347	5.616	31.446	1.6904

—Reference has already been made to the practice of the Chinese in mixing together refuse combustibles with clay, and making of this compound an artificial fuel. Similar processes have been in use among other people, some of which are of very ancient date. The petroleum that is found so abundantly near the Caspian sea and in other parts of the eastern countries is converted into fuel by making a mixture of it with clay; and the Norwegians have long used sawdust and tar in a similar manner. The methods recently introduced in western Europe

of utilizing the dust of mineral coals and of charcoal are nearly all based upon the same principle of making these substances cohere by thoroughly incorporating them with tar or pitch, and then exposing the compound, when moulded into blocks, in some cases to a current of air to dry them, and in others to a high temperature in vessels serving the purpose of retorts. The former mode of drying is employed for mixtures of charcoal dust, tan, and similar substances, with tar or pitch, and the latter when refuse bituminous coal is used with about ¼ of its weight of pitch. Unless this distillation is conducted at a heat of from 400° to 600° F., so as to dispel the volatile ingredients, there is danger of subsequent spontaneous combustion. Some of these compounds of fine bituminous coal, pitch, &c., are found to possess equal if not superior heating power to that of the natural coal, and have the advantage moreover of being conveniently handled and stowed away. As the process is conducted at Blanzy in France, the coal is jigged to separate the slaty and pyritous particles. It is then crushed and introduced into a circular metallic basin, which revolves horizontally in a reverberatory furnace, the flame of which passes under it. Hot tar or pitch is gradually let in upon the coal from a reservoir over the fire to the amount of 7 or 8 per cent., and the mixture is stirred by stationary rakes attached to rods let down through the arched cover. When sufficiently mixed, the materials are made to drop through the bottom into a receptacle, whence they are removed while plastic to the moulds and there pressed by the hydraulic machine. The process of Mr. Bessamer appears to be most highly approved. It is applied only to fine bituminous coal without mixture, the object being to render this plastic by heat and mould it by heavy pressure into convenient shapes. In the softening process the coal may be exposed to the heat long enough for a portion of its volatile elements to be expelled, by which the product is rendered more dense and of the nature of coke; or it may be softened so quickly as to be but slightly altered in its chemical composition. The apparatus employed for the heating is a long rectangular iron retort, set in brick work over a fire and its horizontal flue. The hopper for feeding it is at the front end, which projects from the brick work, and the discharge is through the floor of the retort also in the extreme front end. The fine coal is introduced by a feeding drum arranged to keep the aperture tightly closed. The coal is received upon a horizontal shelf, which extends nearly to the back end of the retort, and it is moved on in that direction by an endless chain, which is furnished with scrapers, and is carried round a drum at each end of the retort inside. As the coal falls from the back end of the shelf upon the floor of the retort, it is pushed along by the chain and scrapers in the opposite direction, till it is discharged at the front end into a vessel placed underneath to receive it. In the bottom of this vessel are 3 openings that communicate with the same number of horizontal cylindrical cavities arranged side by side in a massive block of iron. This block is strongly secured to heavy iron bedplates by keys and bolts, and upon the same foundation is placed the shaft, with its fly wheels and cranks that carry the piston rods or plungers, which work in the cylindrical cavities to compress and push out the blocks of coal. The arrangement of these is exceedingly ingenious. One set of 3 plungers, attached to the same crosshead, are connected by a short pitman directly with the crank in the centre of the shaft; while another set of 3 are worked in guides attached to the bedplates beyond the other end of the cylinders. These plungers, entering the opposite end of the cylinders from the first set, are set in motion by 2 long connecting rods, which pass outside of the bedplate, and are attached at one end to a crank on each extremity of the shaft, and at the other to the crosshead, to which the plungers are keyed as they pass through it. Both sets are thus moved by the same shaft, yet by the arrangement of the cranks upon this, those of the 2 sets being at an angle of 45° with each other, the piston rods are made to approach each other in the block to give the required pressure, and then to separate as the coal is pushed out of the back end by the plungers of the first set. This being done, the revolution of the shaft carries the back plungers in again, a new charge is compressed and thrust out, and thus the operation goes on, delivering 3 of the cylinders of coal with each revolution. The machinery is set in motion by a steam engine. The speed of the feeder drum and the chain and scrapers can be regulated to produce coal more or less volatilized as desired. The gas can be saved by passing it into a gas holder. It is found advantageous to use an air pump for reducing the pressure in the retort; the escape of the gases is thus facilitated at the lowest possible temperature, and the product is more dense when pressed. Highly heated steam may be employed instead of the fire, the steam being driven directly into the retort with the coal, and passed out into the gas holder. Where anthracite dust is cheaply obtained, together with large supplies of refuse bituminous coal, this process may be found still more useful by mixing the two varieties.

—The composition of fuels is commonly expressed by stating the proportions of coke or charcoal, volatile matters, moisture, and ash. The ultimate analysis reduces the whole to its elements, and expresses the proportions of carbon, hydrogen, oxygen, nitrogen, and the ingredients of the ash. In order to ascertain the fitness of fuel for making gas and producing the fatty products, the proportion of volatile ingredients must first be ascertained, and then the nature of these, as the proportion of the inflammable gases to the liquid products. For other purposes the simple form of analysis is commonly sufficient. The ash is obtained by thorough combustion in an open platinum crucible, continued till

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nothing is left but the gray or brown ash. The difference of weight of the crucible and its contents before and after the operation, deducted from the weight of the fuel employed, gives that of the ash. Another weighed sample subjected in a similar way to a heat of about 300° will give by loss of weight the amount of moisture; the crucible containing it is then closely covered to exclude the air, and is set in a Hessian crucible also closed with a cover, and containing calcined magnesia. This supports the platinum crucible, and keeps it from contact with the outer one. The whole is now exposed to a red heat for an hour. The volatile matters are thus driven off, and the difference of weight of crucible and contents before and after the operation gives their proportions. The charcoal or coke is the difference between the crucible with the residuum it contains and that of the crucible alone less the weight of the ash. This may be again obtained by consuming the carbonaceous residue exposed to a current of air. The heating power of fuel is often estimated by what is called the lead test, a method introduced by Berthier, founded on the theory of Welter that the quantity of heat developed by the combustion of bodies is proportional to the amount of oxygen assimilated. If this law were sound, the determination of the oxygen required to take up the combustible constituents in a certain weight of fuel would give at once its comparative calorific value. The results are so nearly correct, and the process is so easily conducted, that the method is still much employed. A weighed portion of the fuel finely powdered is mixed with 30 or 40 times its weight of litharge (oxide of lead), and introduced into an earthen crucible, the mixture being covered with a layer of litharge. The crucible is then carefully closed and exposed to a moderate heat till the carbon and hydrogen have abstracted the oxygen they require for their combustion, and left behind an equivalent amount of metallic lead. This being removed and weighed determines the oxygen that has been assimilated. Johnson found in his experiments that the results thus obtained were constantly about $\frac{1}{4}$ short of the truth. The defect of the process is that it gives the same result whether it is hydrogen or carbon that abstracts the oxygen, the difference of the calorific effect of the same weight of these two elements not being in fact proportional to the difference of oxygen they consume. This has been ascertained by determining, after the method proposed by Rumford, the increase of temperature communicated to a certain quantity of water in the process of oxidizing a certain quantity of fuel or other oxidizable body. The results thus obtained from a great number of substances by different chemists are given in the following tabular form by Dr. Muspratt in the 2d vol. of his "Chemistry." The table referred to presents the results of more than 90 experiments upon 29 different combustibles, including in these various gaseous, fluid, metallic, and other solid bodies.

Name of combustible.	Symbol.	Symbol of product of combustion.	Lbs. of water raised 1° by 1 lb. of combustible.	Lbs. of water raised 1° when 1 lb. of oxygen combines with combustible.	Authorities.
Hydrogen.....	H	HO	34,743	4,343	Dulong.
"	"	"	34,666	4,333	Grassi.
"	"	"	33,808	4,226	Andrews.
Carbon	C	CO_2	7,912	2,967	Despretz.
"	"	"	7,714	2,893	Grassi.
"	"	"	7,900	2,962	Andrews.
Zinc	Zn	ZnO	1,801	5,866	Dulong.
Iron	Fe	Fe_2O_3	1,702	4,340	Dulong.
			2,068	5,925	Despretz.
			1,576	4,194	Andrews.
			2,207	2,207	Andrews.
Sulphur	S	SO_2	2,601	2,601	Dulong.
			2,571	2,571	Hess.
			1,500	1,500	Dalton.

From such a table, the proportions of carbon, hydrogen, and oxygen in any fuel being ascertained by analysis, the number representing its relative heating power may be calculated from the proportions of carbon and hydrogen, after deducting from the latter an equivalent to the oxygen present, the excess only being accounted available for raising the temperature. Still, though the figures of such a table correctly express the total amount of heat evolved and absorbed by the products of combustion of 100 parts of the fuel, the real pyrometrical effect is only known when allowance is made of the quantity absorbed by these products; and this involves the consideration of the quantity of oxygen or air consumed, and of the specific heat or capacity of taking up heat of the several products. This allowance being made, the remarkable prominence of hydrogen in increasing the calorific effect of bodies containing it is found to be greatly reduced; for in its union with oxygen it absorbs $2\frac{1}{2}$ times as much heat as in that of carbon with oxygen; and the amount of this being calculated for the quantity employed, the deduction for the hydrogen will be found considerably greater than for the carbon. It is for this reason, and others which have been mentioned in a previous part of this article, that wood and the bituminous coals are charred, their pyrometric effects being increased by the larger proportion of carbon in the charred product. The intense degree of heat evolved in the use of the condensed fuels adds largely to the capacity of heat of the aqueous vapor, and hence further lessens the value of hydrogen in fuels intended for the uses to which they are applied. But for other objects, requiring a quick heat and at the same time diffused over considerable space, the more inflammable fuels are found more efficient; and according to the mode in which their heating power is estimated they may even be classed as producing a greater amount of heat than the more carbonaceous varieties. Whenever the heat from the combustion of hydrogen can be concentrated, as in the hydro-oxygen blowpipe, a more intense degree is obtained than by the use of any other fuel. Other considerations, therefore, beside the chemical composition of fuels, affect their value. For practical purposes a mere change in the mechanical structure may

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give an entirely different character to them, while their real calorific power is not altered. This is apparent in the coals, which are rendered almost worthless when reduced to dust, until in the patent fuels they are reconverted into solid form. Wood possesses very different values in solid sticks, in shavings, and in sawdust. In ordinary use other circumstances are to be taken into account, as the arrangements for utilizing the heat produced, so that there shall be the least amount lost; also the provisions for insuring perfect combustion of the fuel. The loss of heat resulting from imperfect arrangements in these respects alone has been estimated at full one half of all that generated. The chimney necessarily carries off a considerable portion, as there will be no draught, and consequently no continued supply of air to support the combustion, unless the column floating upward by its rarity produces a partial vacuum to be filled with fresh air passing through the fire. The quantity of this admitted should be limited to a proper excess only of that absolutely required for the thorough combustion of the fuel, and this can be determined for each variety of fuel only by the experience and good judgment of the operator, the object in view being a uniform rate of combustion more or less rapidly conducted, according to the fuel employed and the special purpose to which it is applied. The quantities necessary for complete combustion of one pound of the different fuels are given in the following table, the temperature of the air being 66.2° F. and its weight 0.075 lb.:

Name of fuel.	Cubic feet.
Peat	70 to 149
Peat charcoal	155 to 228
Bituminous coal, by the lead test (average 225)	170 to 279
Bituminous coal, Dr. Richardson	278 to 305
Bituminous coal, average qualities from the coal formation, Regnault	320 to 382
Bituminous coal from the upper secondary formation, Regnault	293 to 326
Coke	194 to 240
Anthracite, by the lead test	233 to 277
Anthracite, Regnault	312

We present below portions of various tables which have been prepared by different authorities to represent the comparative values of the fuels named, according to the methods adopted of determining these. The first is from Scheerer's *Metallurgie*, in which the heating effect is calculated from the results of analysis according to the method explained above, the estimations of Dulong being the standard. The figures in the first column refer to the heating effect of carbon taken as unity.

Name of fuel.	Heating effect.		
	Absolute.	Specific.	Pyrometr. C.
Wood, air-dried, with 20 per ct. moisture	0.86	..	1575°
Kiln-dried, with 10 per ct. moisture	0.41	..	1675
Kiln-dried, without moisture	0.47	..	1750
White beech, air-dried	..	0.28	..
Oak	..	0.25	..
Ash	..	0.24	..
Maple, birch, bird cherry	..	0.23	..
Willow	..	0.18	..
Spruce fir, silver fir, larch	..	0.17	..

Table continued.

Name of fuel.		Heating effect.		
		Absolute.	Specific.	Pyrometr. C
Black poplar, Italian poplar		..	0.14	..
Air-dried turf, with 30 per ct. moisture and 10 per ct. ash		0.37	..	1575°
Best air-dried turf, with 25 per ct. moisture and no ash		0.47	..	1750
Kiln-dried turf, with no moisture and 15 per ct. ash		0.55	..	1975
Best kiln-dried turf, without moisture and ash		0.65	..	2000
Air-dried black charcoal, 12 per ct. moisture and 8 per ct. ash		0.97	..	2450
Perfectly dried black charcoal, with 8 per ct. ash		0.84	..	2350
Air-dried red charcoal, 10 per ct. moisture and 1¼ per ct. ash		0.73	..	2200
Perfectly dry red charcoal		0.64	..	2100
Birch	no moisture, and 8 per ct. ash.	..	0.20	..
Ash, wild service		..	0.19	..
Red beech, white beech, elm		..	0.18	..
Red fir		..	0.17	..
Maple		..	0.16	..
Oak, pear tree		..	0.15	..
Alder		..	0.13	..
Lime		..	0.10	..
Worst quality of air-dried peat charcoal, with 10 per ct. moisture and 56 per ct. ash		0.85	..	2050
Best air-dried peat charcoal, with 10 per ct. moisture and 4 per ct. ash		0.83	..	2350
Sand coal, bituminous coal	5 per ct. of moisture, and same of ash.	0.79	1.06	2200
Sinter, coal more bituminous		0.89	1.16	2250
Caking, most bituminous		0.93	1.17	2300
Anthracite		0.96	1.44	2350
Good coke, with 10 per ct. moisture and 5 per ct. ash		0.84	..	2350
Best coke, with 5 per ct. moisture and 3 per ct. ash		0.92	..	2400
Best coke, with no moisture and 3 per ct. ash		0.97	..	2450
Sand coal coke	no moisture and 5 per ct. ash.	..	0.46	..
Sinter coal "		..	0.41	..
Caking coal "		..	0.33	..

The following tables contain the results of experiments by the lead test, and of the evaporating power of fuels, as given by different authorities. In each table, column A gives the lbs. of lead reduced by 1 lb. of the respective fuel; B, the lbs. of water that may be heated from 32° to 212° by 1 lb. of the fuel; C, air at 66° F. required to consume 1 lb. of fuel (given for wood in Hessian lbs. and cubic feet); D, lbs. of oxygen required for complete combustion of 1 lb. of wood; E, lbs. of water according to analyses.

I. Wood.

Species of wood.	Partially dried.		Containing 2 p. ct. of water		Perfectly dried.			
	Berthier.		Winkler.		Schodler and Peterson.			
	A.	B.	A.	B.	B.	C.	D.	
Oak	12.5	26.8	14.05	31.82	39.82	5.88	134.4	1.256
Ash	....	....	14.96	33.89	39.76	5.85	134.2	1.254
Sycamore	13.1	29.7	14.16	32.07	40.85	5.98	148.4	1.394
Beech	13.7	31.0	14.00	31.71	39.44	5.74	176.9	1.346
Birch	14.0	31.7	14.08	31.90	39.78	5.82	148.0	1.376
Elm	....	....	14.50	32.84	41.25	6.08	161	1.418
Poplar	....	....	13.04	29.54	40.72	5.96	157.9	1.390
Lime	....	....	14.48	32.80	41.87	6.18	162.3	1.429
Willow	....	....	13.10	29.67	39.61	5.80	158.6	1.252
Fir	14.5	32.8	13.86	31.39	41.25	6.04	160.0	1.408
Pine	13.7	31.0	13.88	31.44	40.82	5.98	158.2	1.392
Scotch fir	....	....	13.27	30.06	46.85	5.98	158.3	1.393
Hornbeam	12.5	28.3	....	....	....	....	....	....
Alder	13.7	31.0	....	....	....	....	....	....
Larch	....	....	....	....	41.25	6.04	16.00	1.408

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II. Charcoal.

Variety.	Berthier.		Winkler.		
	A.	B.	A.	B.	C.
Poplar ...	30.60	Average 29.6.	33.50	Average 33.7	Average 203.5 cubic feet.
Sycamore, commercial	30.60		33.23		
Ash ..... commercial	29.60		33.23		
Aspen ...	29.50		....		
Fir ..... enclosed in	32.30	Average 32.2.	33.51		
Alder.... bottles im-	32.40		....		
Birch .... mediately	31.40		33.71		
Oak ..... when made.	31.30		33.74		
Beech	....	....	33.57		
Elm.....	....	....	33.26		
Lime	....	....	32.79		
Willow	....	....	33.49		
Pine.....	....	....	33.53		
Scotch fir	....	....	33.62		

III. Peat.

Locality.	Berthier.	
	A.	B.
Ham, department of Somme	12.8	27.9
Passy, department of Marne	18.0	29.2
Framont, department of Vosges	15.4	34.9
Königsbraun, Würtemberg	14.8	32.4
	Winkler.	
Worst of 24 from the Hartz mountains	11.9	24.9
Best " " " "	18.8	43.6
	Griffiths.	
Allen, Ireland, upper peat	27.7	62.7
" " lower "	25.0	56.6
" " pressed "	13.7	28.0

IV. Peat Charcoal.

Locality.	Berthier.	
	A.	B.
Crouy-sur-l'Ourcq, department of Seine-et-Marne	17.7	40.1
Seine et Ham	18.4	41.7
Essone, much used at Paris	22.4	50.7
Framont and Champ de Feu	26.0	58.9

V. Mineral Coal.

Locality and species.	Berthier.	
	A.	B.
Caking coal from Dowlais, Wales	31.8	72.0
Glamorgan	31.2	70.7
Cannel coal, Glasgow	24.9	56.4
Cannel coal, Lancashire	23.5	53.2
Sand coal, Durham	31.6	71.6

VI. Coke.

Locality and species.	Berthier.	
	A.	B.
A la Garre, coal of St. Etienne	28.5	65.6
Gas coke from Paris	22.0	50.8

VII. Anthracite.

Locality and species.	Berthier.		
	A.	B.	E.
Lamure, near Grenoble	31.6	71.5	72.8
Pennsylvania	30.5	69.1	75.6
Laval { La Chaumière	33.0	74.7	....
Laval { La Baconière	26.6	60.2	....
Corbattière, Savoy	26.7	60.5	....

The qualities of the American coals have been ably investigated by Prof. W. R. Johnson, who was commissioned by the U. S. government for this purpose, and whose report was addressed to the navy department in 1844 (Senate Document No. 386). The results are presented in a condensed form by Prof. Johnson in the American edition of Knapp's "Chemical Technology." His operations were conducted upon a large scale, 4 trials being usually made in ascertaining the evaporative power of each coal, and each trial consuming from 800 to 1,200 lbs. The total number of trials was 144, in which 62½ tons were consumed. The object was particularly to determine what coals were best adapted for steam navigation; and the points of special attention were essentially the same as those to which the attention of the commission afterward appointed by the British government was directed, viz.: 1, the capacity of the coals for raising steam quickly; 2, for raising it abundantly for the quantity consumed; 3, freedom from dense smoke in its combustion; 4, freedom from tendency to crumble in handling; 5, capacity, by reason of its density, of close stowage; and 6, freedom from sulphur. The names and exact localities of the particular kinds of coal which were employed in these experiments are now in most instances lost; but their composition being preserved in the records of their analyses, the principles established are readily applied to other coals of similar composition. It should also be added that the semi-bituminous coals experimented upon were chiefly from the northern margin of the coal basin, but that coals more highly esteemed have since been obtained in the central portions of the basin on George's creek, which, from the preference they enjoy in the coal trade, it is believed would have furnished still better results for this class; and late investigations of Prof. Doremus of New York prove that these coals from George's creek cannot be considered as liable to spontaneous combustion. The English commissioners were Sir Henry De la Beche and Dr. Lyon Playfair. Their first report was made in 1848, and the final report in 1851. Convenient reference for the most important results of these may be made to the article "Fuel" in Tomlinson's "Cyclopædia of the Useful Arts." The table below was arranged by Prof. Johnson from the more detailed tables contained in his report, and was published in the work above referred to. It contains 25 varieties of coals, 5 from each one of 5 different classes, and is succeeded by one summing up the results or presenting a general scale of relative values made up from the averages of the classes. From this it appears that in evaporative power under equal weights the Cumberland class surpasses the anthracite by about 2.3 per cent., and under equal bulks by 1.4 per cent. From single experiments, however, the most water evaporated was with anthracite. [See note, vol. v. p. 384 of this work, article Coal.] The anthracites also surpass the foreign bituminous coals 20 per cent. when we compare equal weights, and 26 per cent. by equal bulks. In freedom from clinker the anthracites stand preëminent; in rapid production of steam, when once in action, the Pennsylvania bituminous coals are somewhat superior to all others, and for rapidly getting up steam the foreign bituminous coals

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are most effective." Column A gives the relative evaporative power of equal weights of coal; B, comparative power of equal bulks of coal; C, relative freedom from tendency to clinker; D, rapidity of action in evaporating water; E, facility of ignition, or readiness with which steam is got up; F, sum of the relative values in the preceding columns.

Class of coals.	Names of samples.	A.	B.	C.	D.	E.	F.
Cumberland, Md., free burning bituminous	Atkinson's and Templeman's	1,000	1,000	282	528	505	3,315
	Easby's "coal in store"	986	946	451	658	286	3,277
	Easby and Smith's	931	903	197	886	329	3,246
	New York and Maryland mining	914	927	111	677	376	3,005
	Neff's	882	906	183	877	298	3,096
	Averages	902	936	235	785	359	3,248
Anthracites of Pennsylvania	Beaver Meadow, slope 5	923	962	1,000	722	207	3,834
	Forest Improvement, Schuylkill	940	905	741	790	150	3,576
	Peach Mountain, Schuylkill	945	964	198	901	142	3,150
	Lackawanna	915	844	484	779	187	3,209
	Lehigh	835	872	555	792	153	3,207
	Averages	911	923	595	797	168	3,395
Free burning bituminous coals of Pennsylvania	Queen's run	960	918	458	726	667	3,734
	Blossburg	908	911	176	996	595	3,586
	Dauphin and Susquehanna	873	835	171	766	602	3,247
	Cambria county	863	860	172	867	250	3,102
	Lycoming creek	833	871	184	706	291	2,885
	Averages	887	878	232	892	481	3,299
Highly bituminous coals of Virginia	Chesterfield mining company	841	722	143	1,000	427	3,137
	Mid-Lothian, screened	836	722	180	730	388	2,856
	Creek company's	787	692	186	981	299	2,885
	Crouch and Snead's	779	746	112	695	431	2,763
	Tippecanoe	724	618	149	875	376	2,742
	Averages	793	703	144	844	384	2,872
Foreign bituminous coals	Newcastle, England	809	776	191	827	595	3,198
	Pictou, N. S., Cunard's sample	792	738	97	928	588	3,143
	Sydney, N. S.	747	669	276	764	434	2,889
	Liverpool, England	733	666	332	857	581	3,167
	Scotch	649	625	107	847	521	2,749
	Averages	746	694	197	844	526	3,027
General scale of relative values, formed from the averages of each class	Maryland free burning coals	1,000	1,000	395	880	692	....
	Pennsylvania anthracites	977	986	1,000	893	319	....
	Pennsylvania free burning bituminous	951	938	390	1,000	914	....
	Virginia bituminous	850	757	242	948	730	....
	Foreign bituminous	801	741	331	948	1,000	....

For further information relating to the subject of fuel, the reader is referred to the articles ANTHRACITE, CHARCOAL, COAL, COKE, GAS, PEAT, WOOD.

FUENTERRABIA, or FONTARABIA, a city and port of Spain, in the Basque province of Guipuzcoa, at the mouth of the Bidassoa, on the French frontier; pop. 2,035. It was formerly well fortified, but the French dismantled it in 1794. It has some manufactures of hempen shoes, linen, cloth, marine stores, and earthenware. It has sustained several sieges, and was the scene of a victory over the Carlists by the auxiliary British legion under Gen. Evans in 1837. During the peninsular war, the Fuentarrabians were reproached with singularly inhospitable treatment of disabled British troops.

FUEROS (probably from Sp. *fuera*, outside, or foreign), the term applied in Spain to the ancient constitutional privileges of the Basque provinces, Guipuzcoa, Alava, Biscay, and Upper Navarre. The original meaning of the word indicates that those provinces are outside of the ordinary administration of the kingdom. Their government is essentially republican, the king having only the power of nominating the corregidor or chief magistrate, whose nomination has to be confirmed by the junta of the province, a legislative body elected by almost universal suffrage. The inhabitants of these provinces are exempt from all taxes and imposts except such as they vote themselves, and claim by virtue of their birth the privileges of Spanish nobility. From the remotest antiquity they have maintained their rights against all the dynasties of Spain. In the 13th century the fueros were embodied in a written code, which was enlarged and reconfirmed in the reign of Charles V. In 1833 the assertion of their privileges by the Basques gave rise to civil war, which lasted for several years and terminated in the formal admission of the validity of the fueros by the cortes and queen of Spain in 1844.

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